The Natural History Society of Maryland

BULLETIN

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OBSERVATIONS IN THE VICINITY OF LOCH RAVEN

III Mammals

By C. Haven Kolb, Jr.

The serious study of mammals, especially of the smaller kinds, demands thorough collecting and the examining and analyzing of many specimens. Chances for observing this class of animals alive and in the wild are comparatively infrequent. One who, in this vicinity, should take a day's excursion with the single purpose of observing living mammals would very likely be badly disappointed. Nevertheless, to those who are in the field a great deal on other matters there often come opportunities for observation of a casual type which are always quite interesting and sometimes of importance. The bird observer is particularly favored in this regard because the daily activity of birds is such that the best time for studying them is during the few hours immediately preceding the full rising of the sun. The ornithologist, therefore, is frequently in the field at the most favorable time for encountering retiring nocturnal creatures or diurnal ones when, being hungry, they are most active and noticeable. And consequently he acquires over a period of years a number of memories of encounters with mammals. It was under such circumstances that the greater part of the following observations were made.

In all I have observed twelve different species of living wild mammals in the Loch Raven Area,* exclusive of bats. They are:

1. Opossum (Didelphis virginiana virginiana)
2. Short-tailed Shrew (Blarina brevicauda talpoides)
3. Otter (Lutra canadensis canadensis)

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*For boundaries of this area see Bulletin of September 1936, Volume VII p.3.

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4. Red fox (Vulpes fulva fulva)
5. Groundhog (Marmota monax monax)
6. Chipmunk (Tamias striatus fisheri)
7. Red squirrel (Sciurus hudsonicus loquax)
8. Gray squirrel (Sciurus carolinensis carolinensis)
9. White-footed Mouse (Peromyscus leucopus noveboracensis)
10. Muskrat (Ondatra zibethica)
11. Cottontail rabbit (Sylvilagus floridianus mallurus)
12. Deer (Odocoileus virginianus virginianus)

I have record of only two species which I have not seen alive. These are the meadow mouse (Microtus pennsylvanicus pennsylvanicus), skulls of which were found by Mr. Hampe in pellets of the great horned owl (Bubo virginianus virginianus) from Dulaney Valley and the eastern striped skunk (Mephitis nigra) several of which I have found dead.

Rabbits and groundhogs are quite frequently seen. The bush and tree-dotted grasslands - moors, I usually call them ---- which are so wide-spread in Dulaney Valley, being merely former farmlands grown wild, are natural nurseries for the former. One can seldom take an hour's walk in this type of country without starting up at least one. Young, unsuspicious ones are often seen during the early summer months. Perhaps this is one reason why the hawk population of this region is so high. In "rabbit season" hunters of another kind also know this to be good rabbit country. While groundhogs are by no means uncommon in this type of country, they are probably more often seen in brushy areas adjacent to cultivated fields or on the borders of woodlands. On the whole groundhogs are one of the easiest mammals to watch, for they are quite unsuspicious if they are approached slowly and cautiously with no sudden movements or noises. Possibly being to leeward might also be of advantage, although I have no notes on this point. They can often be seen sleeping at the doors of their dens in the spring sun, or foraging in clover fields or among other succulent green plants. On cold winter mornings one can usually see on weeds or grasses hanging in front of their holes heavy frost which is formed by the freezing of the moisture in their respiration.

Somewhat less frequently seen are the two squirrels. Gray squirrels cannot be said to be uncommon. They vary considerably in abundance. In deciduous woods they are frequently seen or heard. They are seldom found singly. Quite often they occur in what seem to be family groups. They apparently have little difficulty in gleaning a living. I have seen them at play quite as frequently as at work. While stalking some birds I once ran into a group of about six young ones. I had been rather quiet for the past ten minutes and they seemed to have no inkling of my presence. I sat and watched them for quite a while. They raced all about, chasing each other, chattering, and tumbling about me, indeed almost against me, without apparently recognizing in me anything more than another stationary and innocuous portion of the vegetable kingdom. Red squirrels, however, are definitely shy and much rarer. Moreover, they regularly inhabit quite a different niche. Throughout their range, red squirrels are associated with

coniferous woods and in such a habitat have I found them in the Loch Raven Area. One group lives among rocks on a bank under some old white pine trees near the old dam. The only other group that I know of lives in one of the young plantations of white pine in Dulaney Valley. They are only occasionally heard and behave quite differently from the ones I have observed in the North, where they are very obtrusive and self-advertising. They apparently take more kindly to cooler climates, for I have found them very common and typically loquacious in the hemlock groves of Western Maryland.

Chipmunks are present but not common in the type of country I usually work. However I have seen individuals along the rocky hillsides near the tracks of the Maryland and Pennsylvania Railroad. I am told that they are common on some of the hillsides in the valley of the Gunpowder between the railroad and the Harford Road. For some reason I have never run across fox squirrels in the Loch Raven Area.

I have seen the red fox only once. Some years ago I was exploring one of the wooded peninsulas which jut out into the lake and had stopped to watch some ducks on the water, when I heard an animal going leisurely through the bushes. A few minutes later a red fox trotted out into view not many yards away, loped down an old woods road for a short distance and then turned off into the bushes again. A more congenial habitat for this species would appear to be the moors of Dulaney Valley. Although I have never chanced to see a fox in that vicinity I am sure they are to be found there. Certainly a local hunt club occasionally rides enthusiastically after something in this district and I have observed dens which could very possibly belong to this species.

With such a wide expanse of water at Loch Raven the presence of water loving mammals is not surprising. Muskrats are apparently common. I have seen them several times swimming about in marshy coves. They must use ground burrows much more frequently than lodges. I have seen very few of the latter but the banks in places are honeycombed with tunnels leading from the water. During the past winter I found but one lodge. This was quite near the road at Fitzhugh Branch and must have been seen by hundreds of people. I found no evidence of trapping, however.

For some time I have been told by the employees of the Water Board of the presence of otters. It was not until fairly recently, however, that I saw one and then it was on the opposite side of the lake, two miles or more away from the place where they had been reported. Early one spring morning, with the sun still below the horizon and only pastel shaded clouds in the east, I quietly descended an abrupt slope to the head of a body of water which I call the Fiord. It is a long, steep-sided, and very narrow ravine, which the lake has half filled with water. The upper end is surrounded by woods and even at midday the place seems wild and remote. At this time of the morning it was still filled with chill night air and the trees on the encompassing hills were silhouetted against the pale sky. White mist was rising from the surface of the water which was glassy-still. Soon I noticed

quiet little ripples coming from behind a patch of dead cattails. I had heard no fish leap so I watched the place with curiosity. Presently a small black knob appeared from behind the plants and forged steadily toward my side of the inlet. As it drew near I could make out a sleek dark brown head with beady black eyes and small ears. All the rest of the body was submerged, but through the water I could see a rather long, powerful-looking tail. Progression seemed to be mostly by a sculling motion of the hind-quarters, especially of the tail. About twenty-five yards from me the animal disappeared among some willow bushes. The ripples died out without a sound.

White-footed mice and shrews are no doubt very common but they are seldom seen. The former is a species chiefly nocturnal in habit. On the lower Gunpowder, below the limits of the Loch Raven Area, I once uncovered the nest of this mouse among the duff in the hollow of a large rock. There were several young in it and my companions and I watched the female carry these one by one in her mouth to another niche in the rock several yards away. This last spring I found a young one which somehow had wandered out in full daylight onto the bare, exposed stones on the track of the Maryland and Pennsylvania Railroad near Loch Raven Station. I scampered after it and had it cornered several times, but each time I was so busy watching its movements and making out its color pattern and form that it escaped at last the fate of a museum skin. A live wild short-tailed shrew I saw just once under a culvert while I was examining a phoebe's nest.

May of 1938 was a rather cloudy month with several rather heavy rains at night. One morning after a particularly heavy downpour I found a 'possum resting high in a willow above a flooded swamp. It was in a thoroughly drenched condition and lay extended on a limb paying no heed to its surroundings, apparently grateful for the light and warmth of the rising sun. Its tail had been somehow injured so that at least a third of it was missing. However it was not dead, for when I thumped on the trunk it raised its ears and turned its head toward me but made no effort to change its location. Two weeks later I found the remains of a 'possum about two hundred yards away. The animal had been dead more than a week. The tail indicated its identity.

The elements are not the only enemies of wild life at Loch Raven. Even the largest game does not escape man.

The sun came up behind clouds on the morning of May 22, 1938. I had gone to a small swamp, formed where a brook called Kelly Branch empties into a long estuary on the western side of Loch Raven. In spite of the clouds there was plenty of light when I arrived there at five o'clock that morning. As I worked down one edge of the marsh, watching red-winged blackbirds I noticed that the clouds were breaking in the west. Glimpsing a female red-wing which was acting as if she might have a nest, I directed myself out toward the middle of the swamp. I had scarcely started to crash through the young cattails when I was startled by a loud splashing similar to but much louder than that made by flushing ducks. Looking up just at the moment that the sun burst from be-

hind the clouds, I saw a large deer leaping heavily through the muck on the opposite side of the marsh. For some distance I watched it appear here and there between the trunks of the intervening willows, its body gleaming tawny and white in the golden morning sun. Even after it had disappeared I could hear the sucking sounds made as it pulled each leg up from the mud. I was not too surprised to notice that it lacked antlers, but this is not especially significant at that time of the year.

The next week was rather wet and when I again visited the locality on May 28th deer tracks were common at several places along a nearby bridle path. The same morning I noticed three men cruising about the rough dirt roads on the property of the Baltimore City Water Board. The muzzle of a large powerful rifle obtruded from one of the windows of the car. After that I saw neither deer nor tracks anymore. A dry spell set in and perhaps tracks would not register. But I have doubts concerning this explanation. A shot early on a Sunday morning would never be noticed in that locality. At any rate, for a while a wild deer was residing scarcely ten miles from the center of Baltimore City.

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BIRD OBSERVATIONS

By W. Bryant Tyrrell

Birds of the Sea Shore

Several journeys have been made by me to the sea shore to photograph the gulls, terns, skimmers and shorebirds which frequent the wide sandy beaches, but one will always stand out from the rest. It was about noon, on the 15th of June, 1935, that three of us - F. C. Kirkwood, a noted Maryland ornithologist, my son Arthur, and I arrived at Ocean City. We left the car to the north of the city, and started up the beach in the broiling sun, which, with the reflected heat from the sand and water made it still hotter. The first birds we saw were a small flock of shorebirds, sanderlings, ruddy turnstones and black-bellied plovers, which followed the advancing and receding water as each wave came and went. These birds are not usually found here in summer, for their nesting places are far to the north of us. About three miles up the beach we found a small colony of nine nests of the delicate least tern, but no large colonies as we had hoped. Somewhat discouraged, yet realizing that we could work with this small group, if we could not find a larger one, we returned to Ocean City, and there after questioning some of the fishermen learned that there was supposed to be a large colony to the south of the city. We made arrangements for a boat to take us down there at 5:00 in the morning, and then went back north of the city among the sand dunes, prepared our supper, and as a full moon rose out of the ocean, fixed our beds, crawled in and were soon asleep.

In the evening there had been a slight, cool breeze off the ocean which made sleeping quite comfortable, but during the night it changed, and early in the morning, before dawn, we were awakened

by droves of mosquitoes, making life miserable for us. A refreshing dip in the ocean, a hearty breakfast and we were on our way to the boat. But our skipper was not there. After waiting a short while, we went over to his house and found him still in bed. The trip down the Sinepuxent Bay, in the quiet early morning hours was uneventful. Laughing gulls and common terns, - strikers as the fishermen call them - were everywhere, hunting over the surface of the water for minnows or other bits of food; two double-crested cormorants were seen on some net stakes, and on a small man-made island there was a congregation of gulls and terns. Further along on top of a tepee of net stakes an osprey had built its nest, and protested as we came by.

Landing at a point below where the birds were said to be nesting we deposited our cameras and other equipment on the ground and then separated. It was not long before all three of us found the colony, which contained hundreds of nests of the common tern. We made no attempt to count them, they were too numerous. We also saw about seventy nests of the least tern, and to our great delight, a few nests of the skimmers - the flood-gull of the fishermen. The birds were everywhere, crying and scolding us, and as we approached their nests which were merely a slight depression in the sand they would swoop down at us, as if they were going to strike our faces, but as we ducked, they would swing off, rise and repeat the same operation, with more and more vigor as we came closer to their nests. Some actually brushed our hair or knocked off our hats. In places the nests were so close together and the eggs so nearly blended with the sand that we had to walk with caution or we would have stepped on them.

We erected the blind in a spot from which several common terns' nests, two least terns' nests and one skimmer's nest could be seen. Then I took my equipment, went inside the blind and prepared to wait for the birds to quiet down and return to their nests. I have been in hot places, but I do not believe I was ever in such a hot spot as on that day, and never do I hope to be in as hot a place again. The sun beat relentlessly down on top of the canvas blind, and the reflected heat from the hot sand came up, and I sweltered and squirmed as I waited for the birds, which were reluctant to return while that odd looking contraption was near their nest. It was one of the longest and hottest two hours I ever spent. Yet the photographic results were gratifying.

Suddenly pandemonium broke out, and looking out of the peep hole, I saw my son approaching to inform me that the boat had returned and that it was time to pack up and go home.

A Canoe Trip Down the Patuxent River

On May 13th and 14th, 1933, Gilbert Klingel and I had an extremely interesting canoe trip down the Patuxent River, where we photographed a number of birds. We put the canoe in the river about 10:00 p.m. at Hills Bridge near Upper Marlboro, and in the foggy darkness paddled blindly down the river for an hour or more accompanied by a chorus of croaking frogs. In places they must have been legion, for their croakings sounded like a low rumbling. Now

and then the call note of a rail was heard and once we heard the faint, far-away call of the whip-poor-will. About 11:00 p.m. we found a little pier, landed, made our beds on the ground and were soon asleep.

It was still quite dark, though there was a faint glow in the east, when a whip-poor-will started calling near by and woke us up. As we lay half awake, listening to its incessant calls, the night gave way to dawn, and the dawn to day. By the time we were up robins had begun to sing, the beautiful, bell-like song of the wood thrush was heard, and by the time the savory smell of our bacon and eggs filled the air the woods rang with a beautiful chorus of bird voices. It was still very early when we rolled up our blankets, gathered our few belongings together and started off in the canoe.

The river at this point is wide and sluggish, bordered on either side by extensive growths of wild rice, cattails, and other water plants - excellent feeding grounds for birds, particularly in the fall. But as we paddled out on the quiet water, comparatively few birds were seen. However, a crow or two flew over, a buzzard was lazily circling high overhead, a spotted sandpiper called and flew as we approached too close to the muddy bar on which it was feeding. An osprey was seen perched on a dead stub near the water's edge, two great blue herons were feeding at the edge of the marsh, a few red-winged blackbirds were seen, and a long-billed marsh wren was singing somewhere among the reeds. As we glided noiselessly along a water snake crossed the bow of our canoe, and after several attempts to catch him we went on, realizing that there were easier ways to catch one than to be chasing it in the water.

As we neared a railroad bridge a kingbird with nesting material in its bill attracted our attention. It flew to an old pile, busied itself for a few minutes and then was off again. On examining the pile we found the beginning of a nest in the rotten, cup-shaped top of the pile, which was only slightly above the high water level. The nest was no doubt washed away before the young were out of it. Beyond the bridge two pair of osprey were seen circling high above the water in their incessant hunt for food, possibly at the same time hunting for a suitable nest site. A pair of blue-winged teal flew over on rapidly vibrating wings, and were soon lost to sight. As our canoe glided noiselessly along towards a point of land that jutted out into the water, a kingfisher made its presence known by its rattling call, dove into the muddy water and came up with a sparkling fish in its bill and then went off down the river. Beyond the point was a rather high wooded bank, at the base of which several great blue herons were feeding among the tangle of weeds and fallen branches. They saw us before we saw them, and flew up into the pines on top of the bank. Hoping that we might find a colony of them nesting up there we piloted the canoe among the snags, fastened it securely and scrambled up the sandy banks where we found ourselves in a beautiful natural forest garden, with an abundance of bird life, though no rookery of herons. The woods were composed of a mixed growth of pines and deciduous trees. Azaleas, dogwood and redbud were in full bloom; anemone, spring beauty and violets were

everywhere, and here and there were clumps of the beautiful pink lady's-slipper, one of our native orchids. It was an inviting spot where we would have liked to spend considerable time, but we felt that we must go on, for we still had a good distance to cover before we reached Lower Marlboro, our destination.

By the middle of the morning we were well along on our journey and being thirsty we decided to stop at the first likely looking place we saw. We soon came to an old wharf, back of which were several neat looking houses, which, no doubt, in the heyday of the river must have been a regular stopping place for the steamers that plied up and down the stream exchanging supplies for tobacco, but now it was a dilapidated affair, its two large sheds fallen into decay, their roofs half rotten away. Barn swallows were flying back and forth from under the wharf, where on investigating, we found eight nests, two of which contained eggs. In a clump of tangled sumac near the pump from which we quenched our thirst, were a number of white-throated sparrows, a towhee, and a pair of cardinals. From a nearby tree a beautiful song was heard, and a flash of bright orange and black in the bows revealed our State bird, the Baltimore oriole.

From the old wharf the river wound through wide expanses of tidal marshes, with the green fields beyond dotted with farm houses, or the more pretentious homes of some old Maryland families. As the heat of the day increased very little bird life was to be seen. Here and there we saw a few red-winged blackbirds, a marsh wren or two, and now and then heard the booming of a bittern or a gallinule. But for the most part the rest of the journey was uneventful as we were borne quickly and quietly along on the sluggish, muddy waters of the river. By mid-afternoon we had reached Lower Marlboro, and there loaded the canoe onto the waiting car and were soon on our way home.

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KNOW YOUR MUSEUM

One of the most popular exhibits at the Museum is that of the reptiles. It is rather strange that man seems to fear snakes more than any other small animals, and yet, whenever snakes are exhibited either alive or mounted, crowds of people can be seen looking at them for long periods at a time.

Among our exhibits at the National Flower Show, held in 1937 at the Fifth Regiment Armory in Baltimore, was a display of several snakes which attracted considerable attention. The aisle was nearly always blocked and on several occasions it was necessary to secure the aid of the police to keep the crowds moving - all because of some harmless snakes.

But the reason for the crowds is obvious - snake displays fascinate man. Man feels secure so long as the snakes are in captivity or dead, but when they are free he keeps at a respectable distance, or tries to kill them if possible.

Most persons are not aware that snakes are valuable to man, especially to the farmer. Even the copperhead and rattler, though poisonous, live mainly off rats and mice.

There are approximately twenty-five species of snakes in Maryland of which only the two mentioned above are poisonous. These poisonous snakes can be easily identified from the others. An excellent aid to the knowledge of snakes is a book written by Dr. Howard A. Kelly, entitled "Snakes of Maryland," published by our Society. This book gives a graphic description of the life histories of our snakes with special keys for their identification.

The exhibit in the Museum is an outline of our reptiles, poisonous and harmless, so presented that the public may become better acquainted with the harmless types which should be protected, inasmuch as they are beneficial.

E.B.F.

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NOTES FOR THE MONTH OF AUGUST, 1938

Meetings and Lectures at the Society

August 2 - General Assembly. Talk by Mr. Earl H. Palmer, "Value of Our School Loan Service".

3 - Meeting of Mineral Club.

5 - Meeting of Bird Club.

9 - General Assembly. Talk by Mr. Elra M. Palmer, "Our Nature Summer School".

12 - Meeting of Plant Club.

16 - General Assembly. Talk by Mr. Frank Yingling, "Structure of Teeth, Jaws and Beaks of Fish".

23 - General Assembly. Talk by Mr. Edward McColgan, "Nature Photography of Birds".

30 - General Assembly. Talk by Mr. Harry Robertson, "Venomous Snakes and Their Poisons".

Junior Divisions

August 6 - Joint Meeting for girls and boys for Photographic Course conducted by Mr. Edward McColgan and Mr. Edmund B.Fladung.

August 13 - Boys' Meeting. Talk by Mr. Sidney Gaylor, "Crocodiles". Talk by Mr. Wilmer Davison, "Tropical Fish".

20 - Boys' Meeting. Talk by Mr. Elias Cohen, "The King Snake and the Copperhead".

27 - Boys' Meeting. Lecture by Mr. Elra M. Palmer, "Niagara Falls".

Lectures to Outside Organizations

August 3 - Lecture to Baltimore Girl Scouts' Day Camp, Herring Run Division, by Mr. C. Haven Kolb, "Some Common Birds about Baltimore".

11 - Lecture to Chesapeake Marine Biological Laboratory by Mr. Gilbert C. Klingel, "Shipwrecked on Inagua".

15 - Lecture to Baltimore Girl Scouts' Day Camp - Gwynns Falls Division by Mr. Elra M. Palmer, "Maryland Trees, How to Study Them, and Forest Conservation".

Other Services and Activities of the Society

August 3 - Completion of Nature Summer School. Awarding of certificates by the President and Director of Education. The School was conducted for a period of three weeks under the direction of Mr. Elra M. Palmer, Director of Education, assisted by Mr. C. Haven Kolb and Mr. Earl H. Palmer.

4 to 28 - Nature Art School sponsored by the Society in cooperation with the Federal Arts Project of Maryland. Directed by Mr. Elra M. Palmer, Mr. Aaron Kameny - Instructor, assisted by Mr. William Moorefield.

17 - Trip of Plant Club to State Patapsco Park. Conducted by Mr. Earl H. Palmer, Assistant Curator, Department of Botany.

Special Notice

Below is the schedule of meetings of the Society's Nature Clubs:

First Wednesday - Mineral Club
First Friday - Bird Club
Second Friday - Plant Club
Third Friday - Insect Club

Any member interested in any of the above clubs is cordially invited to join as many of these clubs as he or she cares to. There is no extra charge for participation in the club activities.

Lesson 15 - Boys' Meeting. Talk by Dr. Sidney Taylor, "Overcomers", followed by Dr. Milner Davison, "Personal Purity".

20 - Boys' Meeting. Talk by Mr. Fritz Cohen, "The Land Bounce and the Conqueror".

27 - Boys' Meeting. Lecture by Dr. Ellis R. Fisher, "Heroes Tried".

Lectures in Quiet Conversation

August 3 - Lecture on the Baltimore Great Fire of 1904, showing the devastation, by Dr. C. Frank Mott, "Our Phoenix Rising from Baltimore".

11 - Lecture by Professor Martin Schlegel, Johns Hopkins University, "Adventures in Science".

18 - Lecture by Dr. Ellis R. Fisher, "Inspired Times, Use by Strong Men, and Great Achievement".

Spring Services and Activities at the Chapel

August 2 - Organization of Junior Church Choir. Meeting of Junior Choir with the Director and Director of Music. The Choir will be conducted for a period of four weeks under the direction of Mr. Ellis R. Fisher, Director of Education, assisted by Mr. C. Frank Mott, Junior Church Superintendent.

9 to 16 - Junior Art School conducted by the Junior Church in conjunction with the Junior Arts Department of Converse. Directed by Mrs. Edith M. Stanley, Mr. Junior Kenney - Instructor, assisted by Mr. Milton Cooperfield.

17 - Pres. and Mrs. Ellis R. Fisher Delicious Tea. Conducted by Mrs. Emma H. Kenney, Assistant Director, Department of Music.

Spring Program

Below is the schedule of activities of the Junior Arts School:

First Semester - Lower Class
Second Period - Mid Class
Second Period - Upper Class
Third Period - Lower Class

Any member interested in any of the above classes is cordially invited to join as many of them either as he or she desires to. There is no extra charge for participation in the class activities.

The Natural History Society of Maryland

BULLETIN

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MARYLAND TODAY - THE RESULT OF AN ANCIENT YESTERDAY

By Gilbert C. Klingel

Geography should be a science of three dimensions. The first dimension should be length, the second breadth and the third, like the fourth of Einstein, should be time. But to fully understand the meaning of this statement we must journey a few miles out of Baltimore to a place south of Bodkin Point where the Patapsco merges into the cleaner waters of the Chesapeake. To be more precise we must journey to Pinehurst, that odd assortment of beach-side houses perched in varied assemblage on a number of high bluffs. However, we must forget the houses, for they will not transport us into the geographical third-dimension. Instead we must scramble down the bluffs, or choose one of the more substantial stairways that ramble down to the water's edge. Here we will find a great and diversified number of bulkheads, some concrete, some wood, some a mixture of both -- all erected to save the ever receding bluffs from the onslaughts of the tumbling waters. A few houses, belonging either to the careless or the none-too-opulent, lack bulkheads and it is to these that we must go to see geography in its fullest. To the uninitiated this first glimpse of third-dimensional geography will be disappointing and not very inspiring but these unbulkheaded bluffs expose one of the most interesting stories in Maryland.

Protruding from the banks are great tangles of root and stump, intertwining fibers and blackened knees. Drop to a crouching position and examine these roots and stumps carefully. If you know anything about wood grain and wood structure you will soon note that there are no trees bearing graining like this near Pinehurst today. They are cypress stumps, and cypress knees, remnant of what once was a magnificent cypress forest. Measure the buttresses or better yet saw them in half and count the growth rings. You will find that the rings go well up into the hundreds -- mute evidence of great age and arboreal dignity. Yet

Yet today, fully fifty feet of yellow clay and sand lie above these fallen giants. Fifty feet of silted earth and debris and on top of this a deep sandy humus and the houses of a new world culture. What happened that this stately forest should have been overwhelmed and buried, lost for a million years to the sunlight and air? The story of what happened is what we are pleased to term three-dimensional geography.

Cross the narrow peninsula on which Pinehurst is located and examine the banks along the Magothy River. Close to the water and in some places dipping beneath the soil is a narrow band of blackish earth, moist but yet charcoal-like in its consistency. Buried in this charcoal earth and part and parcel of it are numerous strips of soft substance which once were wood and leaves, trees and lush shrubbery. Even today the distinct silvering of the original grain may be seen and occasionally one recognizes a knot where a branch broke from a trunk or where nature healed some wound inflicted long ago. Some of these long dead wood-pieces are beautifully crusted over with iron pyrites, fool's gold, percolated from the overlying beds and crystallized during the years.

Likewise, from a spot near Westport not so many months ago some of the Society's geologists unearthed a round earthy object which at first appearance seemed but a big nodule of yellow clay. But later in the laboratory, cleansed of its encrusting matrix, the object revealed itself as a symmetrical ovoid, pitted every inch or so with diamond shaped holes. The object was a cycad stump, a palm-like plant that flourished in the days of the dinosaurs.

Hancock, Maryland, is to most folks just a little town sprawling lengthwise in the narrow valley of the Potomac midway between the cities of Hagerstown and Cumberland. But to the writer Hancock is a place of absorbing interest -- not because of any industry that flourishes there, not because the people are any different but because only a few hundred yards from the center of town is a spur of rock. The spur of rock is hidden between two wooden houses and is nearly obscured by a chicken shed. But it is one of the most interesting features of the entire town -- although probably not many in Hancock are aware of its existence. In a narrow ledge on that spur are clustered hundreds, nay, thousands of little sea-shells, or rather the impressions of these sea-shells, for their substance has long since been wasted away. And in these sea-shells reposing in their flattened ledge of red sandstone we have a link with the long forgotten past, with an ago so long gone that it is difficult to even count the years since its passing. The site of Hancock was once a rolling sea in a day when only the lowliest forms had their being, when man was not even a dream, when not a moving thing stalked the barren land.

And across the Potomac River barely two miles away is a great quarry, source of the white sand from which glass is made. That quarry is many hundred feet deep and its workings have carved away nearly half of the mountainside. And from that quarry for a distance of several miles exists a section of eight more quarries as large or larger, and each of these quarries, like the first, is composed solely of the impressions of countless sea-shells, the fallen bodies and body coverings of a million million sea creatures, curled-up molluscs, the long fragile stems of extinct sea-lilies, crinoids they are called, and the fused material of a billion micro-things. Think of it! A whole mountain of sea-shells and their fused pressure crushed

remnants. Think of the countless centuries that this mountainside lay beneath the waters of an ancient sea to accumulate these billions of shells, to have accumulated these hundreds of feet of shell-laden rock. Consider too that this rock was pressed tight by the weight of great pressure before it reached its present flint-like state. Before evidence such as this we can only stop breathless, silent, somehow dimly aware that the entire history of human activity is but a momentary flicker in the face of time. And as we gaze down on Hancock, and the little towns and houses in the valley, we cannot help but be aware, if we are conscious of three-dimensional geography, that if these little towns exist to last a thousand years it will be as nothing to that which has gone before.

Beyond Hancock and Cumberland, towards Frostburg and the west are the great coal beds of Western Maryland. The story of coal is too well known to recount here but we cannot ignore the fact that the bituminous industry owes its very existence to the long gone ages. The narrow beds of coal are nothing but the carbonized remains of riotous swamps that had their being when Western Maryland was a warm tropical land replete with the most luxurious vegetation the world has ever known. It was an era of great fern-like plants and huge mosses that sprawled over the soil in great green profusion. Today these swamps are tightly compressed between the soils that went before and those that came after, an historical sandwich, so to speak, or to use a better simile, a crushed and blackened page in the geological book of Maryland history.

The story of Maryland past and its relation to geography of today might well be made into an epic if we could only have all the facts in our hands. It would be a story of magnificent struggles, of how great hordes of creatures battled with time for their right to live; it would be a story of victories and tragedies, intermingling one with the other, as race after race reached its climax and passed into the limbo of defeat. And the epic would be staged in the grand manner with ponderous shifting of scenery. And in this shifting of scenery itself would be material for still another epic, of how the forces of land and sea fought for mastery, of how first one prevailed and then the other, of how in the titanic struggle the land crumpled and was broken and was covered over by the silt washed down by the sea that sent the rain to gnaw away at the rocks and the soil. And again the epic would describe how the land would rise again and push the sea back whence it came, and of how the land would take with it as tribute part of the sea-bottom which the sea had covered with its creatures in countless multitude. There would be intermissions in the great play when for a thousand, thousand years all nature would be quiet, when only the still waters would lie over the place called Maryland.

And then there would be other thousands of years when the great forces that made the mountains would be assembling their powers for the work to come. There would be storms and earthquakes and great bendings and twisting of the earth's crust. Rivers, mighty streams and little brooks would come and go, would make valleys and destroy them again. Some of these rivers would flow for a thousand years, would flow until the great ocean would creep up their valleys and drown them, gathering them to its substance, just as in our own age the ocean has crept in and drowned the lower river of the Susquehanna.

But we do not have all the facts in our hands, for these titanic struggles have destroyed the fossils, the recording script of the mighty play. Only here and there, like scraps of paper in a deserted theatre hall, are the fragments -- dinosaur bones and sequoia cones from Muirkirk near Washington, D. C., crocodile teeth from Charles county, whale skulls from Calvert, crustacean-like trilobites from Frederick, mud cracks and algae marks in the stone slabs of Conococheague Creek, the remarkable find of a cave full of extinct mammal remains on a cut in the Western Maryland railroad, -- these and a few others are all that is left of the great multitudes that have slipped down the passages of time. The wonder is not that the vestiges of the ages are so few but that they are so many. Consider that our Appalachians are but worn and eroded fragments of what once were probably magnificent mountains, consider again how the rocks have been folded and twisted nearly beyond recognition, consider that in these foldings and twistings great heat and pressures have fused and melted the rocks, and consider how the constant seeping of waters has sculptured the hills and carried away the records a grain at a time. Nearly all that is visible today as a record of the great Miocene age are a few cliffs, fossilized exposures fronting on the Chesapeake in Calvert County. Stand on any beach near these cliffs and watch how the bay waters are breaking them away, every year taking a few feet, a few yards, destroying the little that remains. Then consider that this has been going on for countless centuries and you will understand.

Far out in the ocean, nearly sixty or seventy miles from Ocean City and the sandbars on which Ocean City rests, the floor of the ocean slopes gently out, undulating very slightly, dropping easily away towards the center of the sea. And so the bottom continues for a few miles -- until suddenly it disappears into the depths of everlasting night. It is the edge of the continental shelf. From this point on the sands and gravels of the shelf give way to the abysmal oozes and slimes of the deep sea. Why this sudden drop in bottom level, why do the sands change to ooze and slime? And why does not the ocean drop off immediately beyond our coasts, why this long gentle deepening for nearly a hundred miles before the plunge into the unknown depths? Because this is the true edge of Maryland, the Maryland of third-dimensional geography. Many many centuries ago, so some geologists believe -- and there is good reasoning for their belief -- the sea was lower than now; a change of sea level had occurred which was general throughout the world. But before this time for countless other years the streams and bays had been scouring the land far to the west, breaking away the soil and carrying it out to sea. Grain by grain the land was torn away, and grain by grain it was carried to sea and dropped gently down on the ocean floor. And though in all these years the earth was not still -- but was gently rising and lowering, breathing easily as it were -- the great deposition continued until there was built up a great wedge-shaped mud pie with a thin edge lying to the west and a thick edge to the east where the ocean water lay quiet. Even today, on a small scale we can see the same thing happening at the mouths of brooks and streams. The thick edge of this great deposition is nothing more than the edge of the continental shelf, and at one time the coast of Maryland, for in the age of the great lowering of sea level the ocean retreated to the outer slopes. Thus we have a new definition for the Eastern Shore and all the level land that lies between the ocean and the hard crystalline rocks at the beginning of the plateau country that begin on a line drawn between Baltimore and Washington. This low country, Eastern Shore and the bay counties, is nothing more than a

fertile sand and mud flat whose outer edge lies beneath the depths of the sea. But lest one thinks this a slur on the low counties, consider the great antiquity of their making and consider that though nature has, in the passing of the years, poured the ocean again and again over these counties, they have, Phoenix-like, always risen again.

It is difficult to picture Maryland in this age of temperate climate weather as a land fit only for Eskimos, a land where for most of the year icy blasts and thick accumulations of snow were the normal rather than the unusual. But such was the Maryland picture during the glacial ages when the ever advancing ice caps crept southward, moving inexorably on their way, sweeping slowly all forms of life before them. True the great ice cap did not reach Maryland but it came perilously close. In New York and Pennsylvania only a hundred or so miles distant the movements of the great ice sheet are today plainly visible, records in the form of sculptured rocks and great mounds of boulders brought down from regions miles away. We may picture Maryland in that time as a passing ground for the great hordes of animals driven year by year southwards, individual creatures and vast herds trickling down from the north as through the centuries the ice was accumulating.

We may picture mammoths and mastodons, great bears, deer and all the race of carnivores moving down through Pennsylvania, stopping momentarily at the great valley of the Susquehanna,- for then the river mouth was miles further to the east, crossing the river at the fords or swimming the quiet pools between the rapids. We may picture this vast assemblage of living things as having passed on to more equable lands, while only the more hardy stayed to brave the bitter winters. It is not unreasonable to believe, with the polar ice sheet only a hundred miles away, that Maryland was "farthest north" for animal life. And Maryland in that time must have been a dismal place indeed with the Susquehanna frozen in the winter down to the very bottom, and the Potomac likewise, and only a few green lichens to enliven the bleakness of the winter snow.

When the first ice age passed we may picture the great return migration when plants and the creeping, crawling things and the winged birds followed the melting ice back to its northern home. We may further picture the slow replenishing of the land with flowers and green growing things. One by one they came back, some in changed form, some as they were before. Some failed to return and these vanished forever. There is little left to tell of this coming and going of the great ice ages. We only know that the sea rose and fell upon the land as the water accumulated or melted on the thousand foot thick ice sheet; we know that this rising and lowering of the sea left a series of contours or terraces across the Maryland Coastal Plain, successive remains of sea beaches that marked the fluctuations of ocean level. The Capitol at Washington, by the way, rests on the edge of one of these terraces. We also have evidence in the form of huge boulders intermixed with the soils deposited during these times, boulders that could only have been carried by ice and floating bergs. But we have little more.

Maryland today is the result of what yesterday it was. On every hand, if we have the knowledge to interpret, are the signs of the forgotten ages. The hillside on which your house rests may be but the eroded contour of an ancient sea beach, the soil beneath your back yard may have been laid down by some long forgotten river,

and the stones that form the foundations and walls of your dwelling may contain the remains of long dead creatures. Only recently, on the corner of North and Guilford avenues, close to the street level the writer noted a stone window ledge. The stone was grayed with the soot and grime of the city streets but etched by the weather in delicate filigree against the gray background was the lace-like tracery of tiny coralines, minute shells and feathery sea creatures. The story of that one window ledge might well carry us back into the dim hazes of antiquity.

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MARYLAND NATURE LOG
BARE HILLS

The Bare Hills truly deserve their name. Composed of serpentine, a green rock containing large amounts of magnesia, and covered by a thin soil containing much of this element, these hills lying on both sides of Falls Road, less than a mile from Baltimore, and not very far from the suburb, Mt. Washington, stand alone, uninhabited, unploughed, and except for a road or two and some tunnels and holes representing old mining efforts, very much as they were centuries ago.

Hayden's somewhat exaggerated description of these Hills written in 1811 is still of interest: "...The mind seems involuntarily to feel the impulse of melancholy. For the thinly scattered soil, which has been, perhaps for ages, slowly accumulating from a few decayed vegetables which some friendly breeze has borne upon its barren surface is scarce sufficient to nourish a few scattered tufts of grass. A gloomy silence pervades around .... (it seems as if) it had been subjected to perpetual sulphurous exhalations or steams of subterraneous fires. If a fratricidal Cain had here committed his Heaven insulting deed, we need not wonder; it bears so much the appearance of having experienced the unappeased wrath, the eternal curse of an offended Deity. Scarce a solitary lizard, or a creeping ant is here seen ... seeking among the mouldering serpentine to deposit its daily spoils, or screen its tender offspring from the chilling blasts of winter winds which sweep in triumph over this dreary waste."

Animal life is not altogether absent, however, - four foot black snakes, as well as other species, guarding, it would seem, mineral deposits no longer wanted, have been found near the chrome holes hereafter referred to.

To visit the Bare Hills, motor or walk out Falls Road, pass Mt. Washington, cross the bridge over the railroad at Bare Hills station and continue approximately a half mile until you reach the quarries at the juncture of Falls Road and Old Pimlico Road. Turn left on Old Pimlico Road. Before you have gone very far you will note several large excavations on your left - old chrome holes, relics of the days when much of the world's chrome was supplied from this region - reminders of the period when Isaac Tyson controlled the world's chrome supply. In those days (the second quarter of the nineteenth century) chrome was used for paint and not for its present purposes. If you will walk over the hills you will see

a number of chrome pits not discernible from the road; many of these are filled with water. Here and there in rocks lying about the pits will be found small black metallic dessiminated particles of chromite in the serpentine.

H. C. M.

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KNOW YOUR MUSEUM

Because of lack of space at the Museum there are only two woodpeckers on display, the red-head woodpecker and the flicker. As common as these birds are, it is astonishing how little is known of their habits and life histories. Since the Society has received many inquiries regarding woodpeckers in general, the writer thought a brief account of this useful bird would be of interest to our readers.

As their name implies, the woodpeckers are noted for their habit of pecking at the bark of trees. This the bird does to dislodge grubs and other insects of which its food is composed. For this purpose nature has equipped it with a strong bill or beak, having a chisel-shaped point which forms an effective cutting instrument. The tongue which is one of the peculiar parts of the bird's anatomy and an aid in dislodging grubs, ants, etc., is cylindrical in form, terminating in a hard point with barbs upon the sides. The tongue can be extended several inches beyond the tip of the bill.

Another characteristic of the bird's anatomy is the position of its toes. Whereas on most birds there are three toes on the front of the foot, and one on the rear, the woodpecker has two toes on the front and two upon the rear of the foot. This arrangement, plus the sharp claws and relatively short legs enables the bird to cling to the bark of a tree.

The tail which is composed of stiff feathers, terminating in sharp spines is also an aid in bracing itself against the sides of trees.

The bill which enables them to secure food is also an effective tool in excavating deep cavities in the trunk and branches of trees. In these cavities the nest is built. The bird lays from two to nine eggs, depending on the species) which are in all cases white and oval.

There are eight species of woodpeckers native to Maryland, two of which are comparatively rare.

E. B. F.

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NOTES FOR THE MONTH OF SEPTEMBER

Meetings and Lectures at the Society

September 6 - General Assembly. Talk by Mr. Herbert Moorefield, "Species Formation in Drosophila (Fruit Fly)".
7 - Meeting of Mineral Club.
9 - Meeting of Bird Club.
13 - General Assembly. Talk by Mr. A. Llewellyn Jones "Yellowstone Park Wonders".
16 - Meeting of Plant Club.

20 - General Assembly. Talk by Mr. T. Milton Oler, Sr., "Beauties of Nature".
23 - Meeting of Insect Club.
27 - General Assembly. Illustrated lecture by Mr. Gilbert C. Klingel, "In Quest of the Lost Flamingo Colony of Great Inagua Island".

Junior Division

September 3 - Meeting. General Discussion.
10 - Talk by Mr. James Leake, "Enemies of Snakes".
17 - Lecture by Mr. Edmund B. Fladung, "Nature Photography".
24 - Talk by Mr. Joseph Schreiber, "The Minerals of Crystal Hill".

Lectures and Exhibitions to Outside Organizations

September 15 - Nature Art School exhibit at Baltimore Museum of Art.
17 - Enoch Pratt Library, Branch No. 11, plant exhibit.
28 - Lecture to Baltimore College of Commerce by Mr. Edward McColgan, "Telescope and Photographic Lenses".

Other Services and Activities of the Society

September 2 - Conclusion of Nature Art School.
16 - Trip of Plant Club.
16 - Loan of Indian Artifacts to School No. 34.
30 - Loan of Minerals and Wood Specimens to School No. 34.

Gifts Received by the Society

Three Mounted Moose heads, two Deer heads, one Eastern Caribou head, and one Black Bear head from Mr. D. W. Kleinhans.

One mounted Marlin measuring eight and one half feet from Mr. J. D. Steele.

Magazines and Pamphlets from Mr. W. Bryant Tyrrell.

Bird and Mammal Skins from Mr. W. Bryant Tyrrell.

A Mounted Heath Hen from Mr. J. Hammond Brown.

SPECIAL NOTICE

Below is the schedule of meetings of the Society's Nature Clubs.

First Wednesday	-	Mineral Club
First Friday	-	Bird Club
Second Friday	-	Plant Club
Third Friday	-	Insect Club

Any member interested in any of the above clubs is cordially invited to join as many of these clubs as he or she cares to. There is no charge for participation in the club activities.

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The Natural History Society of Maryland

BULLETIN

Volume IX NOVEMBER, 1938 Number 3

NOTES ON THE WATERFOWL OF GARRETT COUNTY, MARYLAND

By MAURICE BROOKS

In the Bulletin of The Natural History Society of Maryland, Volume VII, Nos. 2 & 3, 1936, the writer published a series of notes on the land birds of Garrett County, Maryland, the list including comments on 146 species. The present paper presents notes on the waterfowl of the same region.

Garrett County, comprising the extreme western portions of the State, has had considerable ornithological study, its mountains and heavy woods having been, for a long time, attractive to bird students. Merriam and Preble published a list of the birds of the region in 1900, this work being followed by the extensive studies of Reverend C.W.G. Eifrig in 1904 and succeeding years. Many other ornithologists have paid the area occasional visits.

Since these earlier papers were published however, Garrett County has undergone a number of changes which profoundly affect the status of waterfowl. Chief of these has been the construction of a power dam on Deep Creek, a tributary of the Youghiogheny River. This dam creates Deep Creek Lake, an extensive body of water which is, in migration, attractive to water birds of many species. The much smaller lake near Mountain Lake Park also attracts waterfowl, and there are some other small bodies of water which have shown themselves worthy of study.

In 1934 a systematic study of the birds of four Allegheny Lakes, Lake Lynn and Lake Terra Alta in West Virginia, and Deep Creek Lake and Mountain Lake in Maryland, was begun by a group from West Virginia University. This study has been carried on for five years, with Messrs. I. B. Boggs, A. S. Margolin, J. L. Poland, Karl Haller, James T. Handlan, and many students of the Oglebay Nature Training School taking part. Dr. George Miksch Sutton has also done some collecting in the region. During migration seasons regular trips to the area have been taken, and

numerous observations have been made at other seasons. The permanent camp of the Oglebay Nature Training School at Lake Terra Alta has been a center of interest.

To understand what the creation of these artifical lakes has meant to the bird life of western Maryland, it is only necessary to state that the present paper will list no less than twenty-six species of waterfowl which were unknown from the region to Merriam, Preble, and Eifrig. In addition, many of the species which they found to be very rare, or of only accidental occurrence, are now common at certain times. Heavy flights occur at times of unusually severe storms on the Atlantic Coast, and, in autumn, when there have been storms with heavy winds on the Great Lakes.

Deep Creek Lake, because of its fluctuating water level, is not suited to the breeding requirements of most waterfowl. It is used chiefly as a resting place, although many shorebirds use its mud flats in late summer and autumn, and many ducks find food in the numerous inlets during the spring periods of high water. Mountain Lake offers considerable good feeding territory, but the area is much visited by humans, and is not extensively used by water birds as a nesting place.

1. Common Loon (Gavia immer). Rather common migrant in spring and fall, the birds in autumn remaining on Deep Creek Lake until it freezes over. Flocks of thirty to fifty individuals occur at times on both the bodies of water studied. Thus on the morning of October 24, 1936, Mountain Lake was visited by thirty-six loons.

2. Red-throated Loon (Gavia stellata). One of the region's ornithological surprises was the discovery that this northern species is not rare during migrations. Three individuals, in company with a number of Common Loons, were noted on Nov. 11, 1936. This species was called accidental by Eifrig.

3. Holboell's Grebe (Colymbus grisegena holboelli). Noted only a few times during autumn migration. Not listed by Eifrig.

4. Horned Grebe (Colymbus auritus). This species is often abundant during migration, large flocks occurring at both lakes. Eifrig does not record it.

5. Pied-billed Grebe (Podilymbus podiceps podiceps). Common in migration, but not known to breed in the territory. Its breeding is a distinct possibility however.

6. Great Blue Heron (Ardea herodias). Eifrig regarded this as a breeding bird, but I know of no recent nesting records from the region. It is fairly common during migration.

7. American Egret (Casmerodius albus egretta). Found in late summer and early autumn. So far we have recorded neither the immature Little Blue Heron nor the Snowy Egret, both possibilities.

8. Green Heron (Butorides virescens). Fairly common breeding species throughout the territory.

9. Black-crowned Night Heron (Nycticorax nycticorax hoactli).

Occasional in migration. Not known to breed locally.

10. American Bittern (Botaurus lentiginosus). The presence of American Bitterns in the marshes at the head of Mountain Lake in summer indicates the local breeding of this species but I do not know of a nest's having been found.

11. Least Bittern (Ixobrychus exilis). Another species which may breed sparingly, although corroborating evidence is lacking. Not uncommon during migration.

12. Whistling Swan (Cygnus columbianus). Recorded from the region by Eifrig, but now present in considerable flocks at times. Swans and geese often rest and feed on the mud flats along some of the Deep Creek Lake inlets.

13. Canada Goose (Branta canadensis). Present in good flocks as a migrant.

14. Mallard (Anas platyrhynchos). Common in migration at Mountain Lake, where a few may breed. Not so common at Deep Creek Lake.

15. Black Duck (Anas rubripes). The most common dabbling duck in the region. May breed sparingly. Many of the autumn and winter birds have conspicuously red legs, and would probably be referable to the race, A. r. rubripes. Summer birds are presumably A. r. tristis.

16. Gadwall (Chaulelasmus streperus). Noted in small numbers every year of the study at Mountain Lake. Not often seen at Deep Creek Lake, where conditions do not favor dabbling ducks. Not recorded by Eifrig.

17. Baldpate (Mareca americana). Fairly common in migration, when considerable flocks may sometimes be noted. More common on Deep Creek Lake than are most dabbling ducks.

18. Pintail (Dafila acuta tzitzihoa). Common in spring and fall. Individuals often remain for some weeks at Mountain Lake.

19. Green-winged Teal (Nettion carolinense). Regarded by Eifrig as very rare, but now rather common in migration at Mountain Lake. The autumnal migration is usually early in the season.

20. Blue-winged Teal (Querquedula discors). Common migrant, and a possible breeding species.

21. Shoveller (Spatula clypeata). This handsome duck is often found in some numbers during March and early April at Mountain Lake. We have autumnal records from Deep Creek Lake. Not recorded by Eifrig.

22. Wood Duck (Aix sponsa). Small numbers breed in Garrett County, but the birds are most often seen in migration.

23. Redhead (Nyroca americana). Large flocks are occasionally to be found on Deep Creek Lake. I. B. Boggs noted a flock of

eighty on April 6, 1935. Smaller numbers at Mountain Lake. Eifrig does not list this species.

24. Ring-necked Duck (Nyroca collaris). Another so-called "western" duck which is to be found during migration in good numbers at both lakes. Not in Eifrig's lists.

25. Canvas-back (Nyroca valisineria). Not so common as the last two, but noted occasionally. Twenty-one were seen at Mountain Lake on October 24, 1936. Not recorded by Eifrig.

26. Greater Scaup (Nyroca marila).
27. Lesser Scaup (Nyroca affinis). Under ordinary conditions we find it impossible to distinguish between these two species in the field. At certain times however inlets on either side of the highway along Deep Creek Lake (U. S. R. 219) are flooded, and under such circumstances it is often possible to observe the ducks from a car at a distance of only a few feet. Iridescence on the heads is plainly visible, and we are certain that both species occur. Specimens taken also confirm this. The commonest diving ducks.

28. Golden-eye (Glaucionetta clangula americana). Found occasionally during migration. Individuals sometimes arrive in September, and we noted one that remained at Deep Creek Lake until early May.

29. Buffle-head (Charitonetta albeola). Flooded inlets mentioned above are suited to the needs of these handsome little ducks, and they are sometimes surprisingly common and tame. Easy to observe from an automobile. They remain until well along in May.

30. Old-squaw (Clangula hyemalis). Not uncommon in migration at both the lakes in the territory.

31. White-winged Scoter (Melanitta deglandi). I. B. Boggs noted the first individual of this species seen in Garrett County, a male at Mountain Lake on October 23, 1936. Since that time we have found them at both lakes on a number of occasions. Not recorded by Eifrig.

32. Ruddy Duck (Erismatura jamaicensis rubida). Rather common in migration, sometimes appearing in large flocks at Deep Creek Lake. Its early occurrence in autumn (the last week in August) may be partially explained by the fact that these birds now breed as near our area as Pymatuning Reservoir, in Pennsylvania. Not on Eifrig's list.

33. Hooded Merganser (Lophodytes cucullatus). Sometimes in good numbers during migration, but never seen in large flocks as is occasionally the case with the next two species.

34. American Merganser (Mergus merganser americanus). Eifrig records this as a winter visitor, but it is occasionally common during migration, and I have no winter records from either of the two local lakes. Both bodies of water are usually frozen over after the middle of December, and there are few feeding places for mergansers then available.

35. Red-breasted Merganser (Mergus serrator). As noted above, sometimes in considerable flocks during migration. We have often noted a tendency for the sexes to separate, many flocks being made up of birds of only one sex. It is interesting to find this segregation, common along the Atlantic coast, carrying over into a mountain lake region.

36. King Rail (Rallus elegans elegans). Apparently an uncommon migrant, but there is excellent breeding territory at the head of Mountain Lake, and it would not be surprising to find the birds nesting there in small numbers. Not recorded by Eifrig.

37. Virginia Rail (Rallus limicola limicola). Remarks appearing under the last species apply exactly to this one. Both birds have been found in summer at nearby Lake Terra Alta in West Virginia.

38. Sora (Porzana carolina). Common in migration at Mountain Lake, and in other glady parts of the area. Not known to breed, but such a thing is a distinct possibility.

39. American Coot (Fulica americana americana). Eifrig considered this merely an accidental visitor to the region, but it is now fairly common in migration. Not known to breed, but, like the last, a possibility.

40. Semipalmated Plover (Charadrius semipalmatus). This is one of the more common shorebirds in autumn along the Deep Creek Lake mud flats. In spring the region has very little suitable feeding territory for shorebirds, and we have not noted the present species.

41. Killdeer (Oxyechus vociferus vociferus). The commonest breeding shorebird, present at all times except the coldest winter weather. Killdeers may be seen in open weather during all the winter months.

42. American Woodcock (Philohela minor). A locally distributed breeding species. Eifrig listed it as common, but such a statement would hardly hold true today. There are small areas where two or three pairs may be found during breeding season.

43. Wilson's Snipe (Capella delicata). Of this species Eifrig considered that it must breed, although we are still without positive evidence of such an occurrence. The birds are locally common during migration, and have been noted in summer at nearby points in West Virginia.

44. Upland Plover (Bartramia longicauda). Another shorebird which may breed sparingly in the region, although corroborative details are lacking. Most often seen during spring migration.

45. Spotted Sandpiper (Actitis macularia). Common summer resident throughout the area.

46. Solitary Sandpiper (Tringa solitaria). The presence of small numbers of these birds during summer at Deep Creek Lake suggests that they might possibly breed locally, although such summer occurrences are not to be taken as evidence of nesting. Com-

mon migrant.

47. Greater Yellow-legs (Totanus melanoleucus). Eifrig simply lists "Yellow-legs" from the region, and his notes presumably relate to the next species. The present bird is an occasional migrant, from our experiences most often found in spring.

48. Lesser Yellow-legs (Totanus flavipes). Somewhat more common than the last, seemingly about equally distributed between spring and fall migrations. Statements as to the relative abundance of the two birds published in a former note (Auk:55; 1, p. 127) have not held true in more recent years.

49. Pectoral Sandpiper (Pisobia melanotos). One of the more common migrant sandpipers, arriving early and remaining late. Not listed by Eifrig.

50. White-rumped Sandpiper (Pisobia fuscicollis). We have noted a few individuals, mostly in autumns, and never more than two birds at any one time. Apparently one of the rarer sandpipers, as might be expected. Eifrig does not note it.

51. Baird's Sandpiper (Pisobia bairdi). Single individuals noted by a number of observers on October 18 and again on October 24, 1936.

52. Least Sandpiper (Pisobia minutilla). Occasional in migration, but not nearly so common as the Semipalmated Sandpiper.

53. Red-backed Sandpiper (Pelidna alpina sakhalina). Recorded during late autumn migration at both lakes. Not more than two individuals seen at any one time.

54. Stilt Sandpiper (Micropalama himanotopus). One individual carefully identified at Deep Creek Lake on September 20, 1936.

55. Semipalmated Sandpiper (Ereunetes pusillus). The commonest of the "Peeps", being found during both migrations.

56. Western Sandpiper (Ereunetes mauri). Two individuals noted on September 20, 1936. None of the six last-listed species are recorded by Eifrig.

57. Northern Phalarope (Lobipes lobatus). Eifrig records a specimen individual taken on May 23, 1901. This is our only record for the species.

58. Herring Gull (Larus argentatus smithsonianus). Following early spring storms gulls of several species are often to be found in numbers at Deep Creek Lake. Some hundreds of the present species have been noted on several occasions.

59. Ring-billed Gull (Larus delawarensis). Seemingly about as common as the last species, although it was not noted by Eifrig.

60. Laughing Gull (Larus atricilla). A single individual noted following a storm during the autumn of 1936. This is our only record for the species.

61. Bonaparte's Gull (Larus philadelphia). Sometimes present in considerable numbers in early spring. We have noted flocks of fifty or more. Occasionally seen in autumn.

62. Common Tern (Sterna hirundo hirundo). A migrant which is occasionally present in small numbers. I have never seen it common at either lake. Not listed by Eifrig.

63. Black Tern (Chlidonias nigra surinamensis). Denmead (see bibliography) records these birds in summer from the neighborhood of Grantsville, where he believes that they may breed. We have seen them most frequently in late summer and early autumn.

Since "Notes on the Land Birds of Garrett County, Maryland" appeared in 1936 we have had a number of opportunities to observe these birds, and some new species have been recorded. These additions to the former list seem pertinent to the present paper, and they are accordingly given below.

Duck Hawk (Falco peregrinus anatum). We noted this fine falcon during the autumn of 1936, near Deep Creek Lake.

Barn Owl (Tyto alba pratincola). From reports, breeds sparingly in the Oakland section.

Yellow-bellied Flycatcher (Empidonax flaviventris). Found during early September in the Oakland region. We have insufficient data on which to base a statement as to how common it may be.

Marsh Wren (Telmatodytes palustris). Noted a number of times near the head of Mountain Lake, especially during autumn migration.

Migrant Shrike (Lanius ludovicianus). Shrikes are apparently rare in the neighborhood under consideration, but one was noted on October 16, 1936.

It will be seen that this paper, in combination with the one mentioned above, lists 214 species from Garrett County, irrespective of races which are, in many cases uncertain as to their status. Work in the area is continuing, and progress of the study will be reported in this journal from time to time.

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Division of Forestry,
West Virginia University,
Morgantown, W. Va.

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MARYLAND NATURE LOG

II

THE SQUIRRELS OF MARYLAND

By Irving E. Hampe

The hunting season brings before the public some of our most interesting mammals. Squirrel hunting has always been a favorite pursuit of many of our outdoorsmen and while in such cases the cooking pot and later repast usually ends all interest in the squirrel, one will find much of interest if the gun is laid aside and the notebook and binoculars are used in the pursuit and study of these interesting creatures.

The Gray Squirrel (Sciurus c. carolinensis) is the most common squirrel in Maryland. Every park has numbers of these handsome animals. They become quite tame and lose the wild grace and charm of their woodland kin. They are tree-dwelling squirrels and are not found away from woods. Their homes are in hollows in trees or bulky nests of leaves and twigs in a forked crotch. Sometimes the old nests of crows and hawks are roofed over and lined. About March or April the young are born, usually four to six in a litter. A second litter may be raised the same year.

Larger than the Gray Squirrel, less common, and restricted to the deeper woods is the Fox Squirrel (Sciurus niger neglectus). Its large size and dark, coarse pelage will serve to distinguish this squirrel from the Gray Squirrel. The habits of this animal are similar to those of the Gray Squirrel, although there is not much evidence to indicate that more than one litter, of from two to four young, is raised in a season.

Found only in Dorchester County on the Eastern Shore, is the most handsome of all the fox squirrels, the Bryant Fox Squirrel, (Sciurus niger bryanti). Larger than the typical fox squirrel, it

is bluish gray, thickly grizzled with black on the back, white underneath, a white nose, and a tail with a pronounced black stripe on the outer edge. Its habits are similar to the common fox squirrel.

The Red Squirrel (Sciurus hudsonicus loquax) is a denizen of the forests, seldom found in thickly populated sections. Its small size (about 12 inches in length) and rusty red upperparts, coupled with its inquisitive habits and scolding voice will serve as distinguishing characteristics. The home of this creature is in old woodpecker nests, decayed hollows, or is built of twigs and leaves in some convenient crotch in the limbs. Only one litter, usually four or five young, is born in late spring. Red Squirrels are the most carnivorous of this family. They have an unsavory reputation as robbers of birds' nests.

Unknown to most people, due to its nocturnal habits, the Flying Squirrel (Glaucomys volans volans) is the most beautiful of all our squirrels. It does not really fly, but glides from tree to tree, using the broad lateral folds of skin extending from wrist to ankles, as a sort of parachute. Its tail is broad and flat, and is used as a balancing organ. Its favorite retreat during the day is in hollow trees and if such a tree is found, the squirrel may be driven out by rapping against the trunk. It makes its nest in cavities in trees and raises from four to six young in a litter every year. On several occasions I have known of Flying Squirrels invading houses, and the occupants have been forced to trap them as they raised such a racket at night no one could sleep.

The Gray and the Fox Squirrels are the only species considered as game animals although the Red Squirrel is sometimes taken. Without a doubt these animals furnish a lot of sport during the hunting season, but one will find more pleasure if some attention is given to the study of their habits and their niche among the creatures of our woodlands.

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KNOW YOUR MUSEUM

The preparation of specimens in the Museums for display and exhibition purpose has developed into a science all its own, as well as an art. This is especially true with respect to the mounting of fish in their natural poses and particularly their coloration.

Fish in times past were mounted anything but natural. The skins were sometimes stuffed with plaster of Paris and even with straw. They were then varnished. Naturally the color was wanting, with the result that the fish was generally a brownish color, much shriveled up about the fins and tail.

Today the whole technique has changed. Through modern methods the underlying color with its silvery sheen is reproduced and the shape and form of the animal is maintained, imparting to the whole specimen a lifelike appearance. The process is somewhat costly, but it is truly worth it.

Our fish display is naturally small because of the limited size of our Museum. The specimens exhibited were chosen chiefly to bring out the various types of fish to be found in Maryland waters.

From these an excellent idea can be had of the vast fish population of this state. Also, the plans for the completion of the fish exhibit include their structure and anatomy.

Now with the nearby Municipal Aquarium, in combination with our exhibits, there is an excellent opportunity for the study of fish life.

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NOTES FOR THE MONTH OF OCTOBER

Meetings and Lectures at the Society

October 4 - General Assembly. Talk by Mr. Elmo Masters, "Observation on Wasps".
5 - Meeting of Mineral Club.
7 - Meeting of Bird Club.
11 - General Assembly. Talk by Mr. George Maugans, "Hydro Electric Plants and Their Relation to Topography".
14 - Meeting of Plant Club.
18 - General Assembly. Talk by Mr. Milton Oler, Jr., "Observations on Crabs".
21 - Illustrated Lecture by Dr. Lloyd Bertholf, "The Realm of the Honey Bee".
25 - General Assembly. Talk by Mr. Gilbert C. Klingel, "Squids and Octopi".

Junior Division

October 1 - Talk by Mr. Albert Seitz, "Rocks and Minerals".
8 - Lecture by Mr. C. Haven Kolb, "Observations Made at Loch Raven".
15 - Talk by Mr. Irvin Neserke, "Experimenting With Rats".
22 - Talk by Mr. Elias Cohen, "Snake Venom in Medicine".
29 - Talk by Mr. Irvin Schloss, "Rayon".

Lectures to Outside Organizations

October 3 - Lecture to Park School by Mr. L. Bryant Mather, Jr., "Things We Get Out of the Earth".
4 - Lecture to Boy Scout Troop No. 178, "In Quest of Lost Flamingo Colony, British West Indies" by Mr. Klingel.
17 - Lecture to Baltimore College of Commerce, "Value of Paleontology in Science" by Mr. Elra M. Palmer.
28 - Lecture to Maryland State Teachers Convention, Science Section, by Mr. Elra M. Palmer, "The School Loan Service of the Natural History Society of Maryland".

Exhibitions and Loans

October 8 - Loan of Minerals to Baltimore College of Commerce.
21 - Three Loans of Birds to Maryland State Teachers College.
21 - Loan of Mammals, Central Branch, Enoch Pratt Library.

October 24 - Exhibiton of Insects, Branch No. 7, Enoch Pratt Library.
25 - Exhibition of Indian Artifacts, Branch No. 11, Enoch Pratt Library.
25 - Loan of Fossils to Baltimore College of Commerce.
28 - Exhibition to Maryland State Teachers Convention, Three Habitat Groups, and Three Demonstration Exhibits.
28 - Loan of Woodcock Habitat Group to Manchester High School, Carroll County.
29 - Loan of Caribou head to School No. 92.

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SPECIAL NOTICE

Below is the schedule of meetings of the Society's Nature Clubs.

First Wednesday	-	Mineral Club
First Friday	-	Bird Club
Second Friday	-	Plant Club
Third Friday	-	Insect Club

Any member interested in any of the above clubs is cordially invited to join as many of these clubs as he or she cares to. There is no charge for participation in the club activities.

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The Natural History Society of Maryland

BULLETIN

Volume IX DECEMBER, 1938 Number 4

OBSERVATIONS IN PROTEIN SHOCK

By Taylor H. Greenfield

There has in recent years developed a considerable interest in the subject of protein shock or anaphylaxis, this interest being stimulated by the discovery of a very definite relation between that phenomenon and a number of diseases which had previously been of obscure etiology. Anaphylactic shock "means that an animal already immunized to a protein may die when additional protein of the same kind is injected." Small amounts of the protein egg white may be injected into the body cavity of a guinea-pig over a period of several days with no ill effects. When these injections are stopped, however, a pathological sensitivity to that particular protein is developed with the result that the introduction of a very minute amount of the same material into the animal at a later date will produce what is known as "shock".

The same pattern of reaction as roughly sketched above is apparently the prime factor in many human ailments. The quite common and distressing symptoms designated as hay-fever or rose-fever belong in this group. In some manner the individuals afflicted with hay-fever have acquired the unfortunate distinction of being hypersensitive to the protein found in the wind-borne pollen of some plant or groups of plants. During the winter season when no pollen is in the air there are no untoward signs. No sooner does spring arrive in early March than the trees start scattering their pollen to the distress of the comparatively small percentage of hay-fever victims who are sensitive to this special protein. The principal offenders arboreally seem to be the oaks and maples, but the pines emitting immense quantities of very fine light pollen are luckily mild causative agents.

As the season advances the "rose"-fever group, a much larger and more audible type, begin reacting to the spring grasses such as timothy, orchard grass and June grass. The symptoms (irritation of the eyes, sneezing, etc.) occur only during the pollenization of the particular species of grass to the protein of

which the individual is sensitive; and these symptoms cease immediately upon the air becoming pollen-free. It follows, if the patient leaves an area heavily contaminated with pollen and goes, for instance, on an ocean voyage he will be promptly rid of his symptoms.

With the maturing of the ragweeds about the middle of August the most severe protein reactions are elicited. The ragweed pollen is wind-borne in tremendous quantities and due to its extreme lightness is transported for long distances and to great heights. It is present even in the air lanes, having been collected at altitudes of from eight to ten thousand feet. The reactions to the protein in this pollen are much more intense than to others and the patients not infrequently develop an asthmatic condition.

It has been found possible in many instances to alleviate the sufferings of pollen sensitive patients by injecting progressive doses of the very highly diluted proteins causing the difficulty. If this dosage is watched very carefully a tolerance is built up to greater concentrations of the offending material. Should an overdose be given, symptoms will be elicited and in the event of a gross overdose of protein the patient will be shocked. A very rapid collapse has been witnessed by the writer from what was apparently an overdose of ragweed antigen and no doubt a fatal termination might have resulted had not the condition been promptly controlled by the administration of intravenous adrenalin.

While the above form a large and striking class of protein sensitivity there seem to be many proteins other than that of pollen which can cause such symptoms as sneezing, asthma, urticaria, eczema and possibly other more obscure disturbances. Foods occasionally give rise to any or all of the foregoing reactions and these reactions are frequently quite selective. The writer recalls a young negro girl who complained of asthma and hives upon eating frankfurters. It was demonstrated by dermal tests she was actually sensitive to the protein of mustard seed. As a matter of fact, even a small amount of protein extracted from mustard and used in the intradermal test caused her a marked generalized reaction. A medical friend developed eczema between the fingers following the ingestion of egg albumen in any form and reacted positively when skin tests were made with this substance.

The proteins which can be extracted from feathers, especially duck and goose, sometimes are the origin of asthmatic conditions. The dermal exhalations of various animals, that is the finely divided dandruff suspended in the air, can likewise become extremely toxic to the individual conditioned to react to the particular protein contained therein. One of the most sensitive patients the writer has ever met was a country child who suffered intensely from continual asthma. She was found to be reactive to horse dander and her symptoms were largely cleared up by moving to the city.

An interesting aspect of sensitivity is the fact that it is extremely specific. If a piece of smooth muscle is taken from a guinea-pig sensitized with horse dander suspended in a bath of

physiological salt solution and attached to an indicator so its tonic and clonic rhythm may be recorded on a chart a distinct contraction will be shown upon the introduction of a small amount of horse dander solution into the bath. After one introduction of this material, however, the muscle is desensitized and will not again react upon contact with further amounts of the same horse dander solution. It has been found possible to break down the protein from horse dander solution into various fractions precipitated at different hydrogen ion concentrations. These fractions, or meta-proteins, each give a separate definite amount of reaction and when the muscle has reacted to all of the fractions it would no longer react to the original stock dander solution. Conversely, if it reacted to the original stock solution it would not react to any of the fractions.

Some of the substances which elicit symptoms in humans prove to be quite unusual. One of our patients complained of severe asthmatic attacks every time she heard a mouse in her home. Her difficulty was attributed to psychic disturbance although her history gave no other evidence of mental instability. At that time no protein of mouse dander was available, but it occurred to one of the technicians to bring a mouse into the room without the patient being aware of its presence. The animal was secured and after a very short space of time the woman began having asthmatic symptoms which became increasingly severe until the mouse was removed. Protein solution was later made from mouse dander and the finding was confirmed by marked skin reactions.

Another interesting, although doubtful case in the writer's mind, was that of a research worker who indulged in big game hunting. This gentleman claimed to be hypersensitive to elephant hair. He stated that long before his native guides could discern the presence of an elephant he began experiencing irritation of the eyes and sneezing.

It should not be understood from the foregoing that every case of asthma, eczema, or urticaria is amenable to desensitation with a specific protein. The causes, while they may be of protein nature are in many cases still elusive and it is well-nigh impossible to trace every foreign protein with which the human body may come into contact. Sometimes household dust will give the answer, but in other instances such as urticaria caused by heat and cold or by touch, the difficulty appears to be mechanical. The fact still remains that causative agents have been determined in many diseases and a fertile field for further research has been opened up.

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GOLD IN MONTGOMERY COUNTY, MARYLAND

By Charles W. Ostrander

In Montgomery County, Maryland, near Great Falls one is much surprised to hear tales of gold and gold mines. Five mines of particular note have been operated in this area: the Montgomery Mine, the Sawyer Mine, the Huddleston Mine, the Maryland Mine, and the Ford Mine. Gold is found in its native state in veins of quartz and chlorite schist, and associated with it, and some-

times containing it, are pyrite and a little galena. Veins are located by the outcropping of the quartz upon the surface. Early in the Nineteenth Century, Professor Ducatelle, a famous mineralogist, claimed that this region was capable of producing some gold.

The first legend of Montgomery County and its gold refers to 1848 when some Federal troops erected a tower on the property later to be the Maryland Mine. Washing in a nearby stream they noticed grains of gold in the sand. Their plan was to keep this a secret, and return at the end of the war to work the location. It is said that at the close of the war these men did return, aroused the interest of others, and began operations. From this time on the gold mines of Montgomery County were intermittently productive until about 1917. According to reports of the United States Mint at Philadelphia a fair amount of gold was produced and a few individuals were believed to have become very wealthy although many more lost their money by faulty prospecting and wasteful mining methods.

Of the Montgomery County gold mines, the history of the old Montgomery Mine is probably the most interesting. Nowadays the remains may be found about 150 yards off Persimmon Tree road, surrounded by bush and other growth. What now appears to be an open pit was once five shafts sunk approximately 100 yards apart, connecting on the lower levels. The ceilings have fallen in, accounting for the mine's present appearance.

It was in 1871 that the Montgomery Mine was discovered. It is said that one of the colored boys working on the farm then belonging to Robert Davidson was helping to drive home the cows. Reaching down he picked up a stone to toss at them, and noticing a peculiar glint on it, showed it to one of the Davidson's. This glint in the rock proved to be free gold and was sold for $165.45. A frantic search for more gold followed, and another rock about three times the size of the first was found containing $700.00 worth of free gold.

Davidson is supposed to have mined on his place until 1876 when, further results proving unsatisfactory, he sold 65 acres to a firm for $7,000.

Work was continued for a time but later the firm sold the land to the Montgomery Mining Company, a Baltimore concern which made much more progress. The company employed about 30 men and sank five shafts from 20 to 80 feet deep. A stamp mill was set up, and thousands of tons of ore were removed by two steam engines supplying power for the stamp, hoist, and pumps. A miner of many years experience in the western gold fields was in charge of the mine. The gold procured was melted into bars and sold to the Philadelphia Mint.

At this time the mine again changed hands, the new company bringing with it additions to the machinery already in service. Ore was hoisted by buckets to the surface, or dragged out in cars by mules. Richer specimens of ore were hand picked; the pieces containing free gold were broken in a hand mortar, and the gold extracted. The remaining ore was dumped into crushers, which in turn emptied it into the stamp mill, where the fragments were pounded into a powder by power driven pistons. The crushed mater-

ial was then flushed over copper plates previously coated with mercury, which absorbed the gold and allowed the waste to pass off. After a very rich running it has been said that by noon of a working day there would be a quarter inch of mercury-gold amalgam on the plates. Placing the amalgam in a distilling apparatus, the mercury was distilled off, condensed, and used over again. The gold remained in the distilling crucible in the form of a button. Some of the gold missed by the amalgam process was saved by running the left-over's across a concentrator, - an inclined table crossed by numerous narrow strips or riffles which caught the heavy gold particles. The Companies working the mine found their greatest difficulty was that the gold was found in pockets and small veins which often disappeared due to faulting or other causes, and much time and money was spent in relocating the vein.

Later the mine was operated by another man whose theory was that the gold was to be found in the gravel of the stream beds. He constructed sluice boxes and concentrators for washing the stream gravel. One is told that he became quite prosperous and returned to his home in Chicago.

The last operator of the mine now came upon the scene. By this time the mine was in rather bad shape as a result of cave-ins, and had to be timbered throughout. One of the most interesting incidents concerning the mine occurred at this period. In attempting to fit a cross beam in the shaft the workmen found that a large projection of quartz obstructed them. A workman seized a sledge hammer and knocked it off. In the light of the carbide lamps it was found to be very rich in free gold. The superintendent was called, and he not wanting to lose a grain of the gold obtained an armful of bedding. It is claimed that the free gold from this specimen yielded $2,200.

Of all the mines, the Maryland Mine is the most accessible at the present time. It is located at the end of the new concrete road which stretches from Potomac to the Conduit road. The old office building, water tower, and other miscellaneous buildings and machinery still stand. Large sums of money were invested in this mine, and a few people managed to make their investments profitable.

Most of the mines are now quite difficult to locate since they are covered with small growth. However, if one has the agressive interest necessary he may obtain information as to the location of the various mines from the local inhabitants.

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MARYLAND NATURE LOG

CROSS COUNTRY BOULEVARD, BALTIMORE, MARYLAND.

A bridle path, a stream with its ponds, branches and springs and the Cross Country Boulevard constitute a very wholesome stamping ground for a naturalist. This region is north to northwest of Baltimore, beginning at Jones Falls at Falls Road and extending north of Mount Washington along the Cross Country Boulevard to the Curtiss Wright Air Field, a distance of about three miles.

Water draining off the hillsides to the north of the stream, finds its way by springs to a pond. Soggy stretches are not uncommon as one approaches the bottom of a hillside. Where streamlets are formed, the water flows directly into the main stream.

In the soggy regions, honeysuckle climbs up the trees to great height, following poison-oak or bittersweet. In the less dense places, wild ginger is abundant. The run of flowers is from orchids to skunk cabbage. In the ponds we find two kinds of Lobelias, as well as the Monkey-Flower and the yellow water-lily, ferns, cresses, algae and mosses clog up the springs and small ponds.

The forest is moderately wooded, chiefly beeches, ashes and oaks as the top layer of trees and spice-bush, witch-hazel and dogwood as the second layer. Besides abundant flora and fungi the year round, animals, insects and parasites add to the naturalists' interests.

In 1935 the writer saw a Great Blue Heron fishing out dace in the stream. Again in July, 1938 a small Green Heron was seen; a few ducks have also been noted in the ponds. The Bluebird, Cardinal, Bluejay, Gold Finch, Wrens, Sparrows, Owls and Crows constitute the feathered fauna of the region.

Mammals are scarce, there being only rabbits, squirrels, mice, moles, shrews, opossums and skunks.

The herpetologist would find as the author has, the ring-necked snake, the milk snake, the common water snake (N. sipedon), the black snake, the Brown Queen snake and DeKay snake. In the ponds are newts and several species of frogs and salamanders. Toads and tree frogs are found up hill from the marshes and ponds.

The best fields for observation and collection are for the entomologists. In dead logs, he finds larvae of beetles and wasps; in the ponds and streams, larvae of flies, dragon-flies and dobson-flies; also in streams live worms and nematodes. In flight, the insect kingdom parades itself in nearly all its orders and in trees and on smaller plants, are found galls and other types of nests of insects.

No matter in what branch of Natural History your interests lie, at the Cross Country Boulevard Region you can find something to attract you.

C. R.

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KNOW YOUR MUSEUM

Very few museums have exhibitions in plant life although plant life is all around us. Plants affect every living creature, directly or indirectly, yet strange as it may seem the public concerns itself but little with this important subject.

The reasons that most museums have little or no exhibits on plants are several.

First, plants cannot be properly preserved. Secondly, dried plants do not present a very attractive and life-like appearance. Moreover, pressed or dried plants lose their color when exposed to light. Lastly, to reproduce plants artificially so that they will appear natural is very costly. Yet some important lessons relative to plants can be shown which should be of interest to the public and especially children.

We have tried to convey this idea by showing common seed plants, grouped by the agency by which the seed is spread around and carried often to great distance.

The four agencies by which seeds are dispersed are first: mechanical, in which the pod by some power of its own suddenly cracks or explodes and by sheer force sends the seed some distance from the parent plants.

A second method is by animals. This is accomplished in several ways. Seeds which are stored in the ground by such animals as squirrels may sprout. Furthermore, seeds are scattered in the undigested food of mammals and birds, or may be carried afar when they have become attached to the fur or feathers.

The third form is very simple. The seeds drop into the water from plants growing on the edge of streams, ponds, etc. Here the seed is carried for some distance by the stream, which finally deposits it somewhere along its route.

The fourth and last means is by the most important agency, the wind. More seed is blown by the wind and carried by its force to great distance from its place of origin than by any other of the above agencies.

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NOTES FOR THE MONTH OF NOVEMBER

Meetings and Lectures at the Society.

November 1 - Talk by Mr. Irving E. Hampe, "The Cow Bird".
2 - Mineral Club.
4 - Bird Club.
8 - Talk by Mr. Richard E. Stearns, "Linguistic Stock of the American Indian".
11 - Meeting of Staff.
15 - Talk by Mr. Andrew Goss, "Ducks and Geese".
22 - Lecture by Dr. William H. Brown, "Forests of the Philippine Islands".
29 - Talk by Mr. John B. Calder, "Mound Builders of Ohio."

Junion Division

November 5 - Talk by Mr. Carl Oertel, "The Osprey".
5 - Meeting of Herpetology Club.
12 - Talk by Mr. Ralph Powell, "Mica".
12 - Meeting of Herpetology Club.
19 - Lecture by Mr. Herbert C. Moore, "Petroleum".
19 - Meeting of Herpetology Club.
26 - Talk by Mr. Burtis Bennett, "Dragon Lizard of the Comodo".

November 26 - Meeting of Herpetology Club.

Lectures, Exhibitions and School Loans

November 1 - Western High School. Loan of Insects.
1 - Baltimore City College. Loan of Insects.
1 - School No. 34. Loan of Birds.
2 - Outdoor Life Federation. Window display, Duck Group.
2 - Maryland Conservation Commission, Exhibition of Maryland Ducks.
3 - Baltimore City College, Loan of Insects.
4 - School No. 34. Loan of Flicker Habitat Group.
5 - Towson High School, Science Group. Museum Tour.
5 - Maryland State Teachers College. Loan of Birds.
9 - Federated Womens Garden Clubs. Loan of Birds.
18 - Lecture at St. Johns Lutheran Church, Hagerstown by Mr. Gilbert C. Klingel, "Travels of a Naturalist in Greater Inagua Island".
18 - Nature Photographic Exhibition in conjunction with the Camera Club of Baltimore at the Maryland Institute.

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CLUB NOTICE

As there are many members who would like to pursue the study of one or more nature subjects, the Society has inaugurated a series of Clubs for this purpose.

Mineral Club - First Wednesday of each month.
Bird Club - First Friday of each month.
Plant Club - Second Friday of each month.
Photographic Club - Third Friday of each month.
Herpetology Club - Every Saturday at 7:00 P. M.

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The Natural History Society of Maryland

BULLETIN

Volume IX JANUARY, 1939 Number 5

Stoloniferous, Pedal Disk and Somatic Budding in the COMMON SEA NETTLE, *Dactylometra quinquecirrha*, L. Agassiz

By R. V. Truitt, Director,
Chesapeake Biological Laboratory
Solomons Island, Maryland

The sea nettle, *D. quinquecirrha*, L. Agassiz, is exceedingly abundant throughout the Chesapeake Bay and in many other sounds and bays along the Atlantic Coast. Observations made on this form, both under controlled conditions and in the natural habitat, have disclosed three types of asexual reproduction, all of which are common to the scyphistoma, or polyp stage, of the alternate generation of the metagenatic cycle of the species.

(1). These polyps have been observed to develop stolon-like runners upon which buds may develop to produce new polyps. In this fashion polyps may develop from more than one stolon and become numerous around the parent polyp.

(2). A common type of asexual reproduction, in this form, is that of the formation of pedal discs in which the polyp seems to slough off a small segment, less than one-twentieth the size of the original polyp, and move away from this attached segment which, in turn, proceeds to develop tentacles and a mouth, and to produce a normal polyp, both in size and completeness. Several of these pedal buds may be produced by a single polyp.

(3). Somatic budding, the third type, is less common in the polyps of this form than is reproduction by a pedal disc. The nature and form of somatic budding is similar to this type of asexual reproduction in other polyps.

It has been observed that following strobilization the basal element or "stem-mother", of the scyphistoma of Dactylometra does not die. To the contrary, this element typically develops new tentacles and other members to become a complete new scyphistoma which lives over the winter into the second year to produce ephyra and to complete strobilization again. The number of ephyra produced in the second year, by this schphistoma, is the same, namely five or six, as that produced from the same individual during the previous year. The ephyra produced under such conditions are vigorous and normal in every way. Regeneration in the same stem-mother has been observed over a period of three successive years in which, when mature, there seemed to be no dimunution in size, in function or in reproductive capacity. Such polyps, now in their fourth year of age, are still under observation. Not only do they live long periods of time and continue to reproduce by strobilization, but repeatedly these old polyps have reproduced by the other asexual methods.

Considering that there are three methods of budding in the polyp of the common sea nettle, and in view of the fact that the stem-mother of a strobilizing group does not die but, to the contrary, becomes reinvigorated and reproductive, while every polyp produced by these several methods produces, in turn, through strobilization, five or six ephyra or larval jelly-fish, there is suggested an explanation for the appearance of the extraordinary numbers of jelly-fish in Chesapeake Bay waters.

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COLLECTING INSECTS IN WINTER

By Clyde F. Reed

The busy metropolis of swarming insects, rising to its peak in July and August, gradually becomes depopulated as the mean temperature crawls under the freezing point. By January the entomologist may put his cyanide jars away and set his net in the corner to catch dust instead of insects; and he may shove the mounting boards a little further back on the table and throw the aquatic equipment thereunder, and may even hibernate his interests until the thermometer shadows 40° F again.

On the other hand the energetic entomologist may, if he wishes, find a broad field in which to enjoy a different type of collecting. A pocket knife, a cyanide jar, and a few paper sacks will be sufficient equipment for this purpose.

The collector in winter is faced quite naturally with very different conditions than he is in summer. Snow may be on the ground, or maybe it is only freezing and no snow has yet fallen. In any event he may find himself in a wooded area with fallen trees, some old stumps and a thickness of leaves, newly fallen last Autumn, and if there is an open field bordering the woodland, he will quickly note innumerable insect nests; galls in the stalks of Goldenrod and Blackberry brambles, caused by living larvae of minute wasps, the eggs having been laid in the stalk the preceding summer; "Oak-apples", which are galls on Oak leaves, caused by wasps of the superfamily, Chalcidoidea; the

remnants of "leaf-miners", common in leaves, a "leaf-miner" being a very small insect, some Coleopterous, some micro-lepidopterous, which lives between the epidermal layers of leaves; these also live in stalks of plants; bees' nests a few feet above the ground, in a thicket, well protected, yet accessible; also on twigs at the same level are found clay nests of ants and the mud pottery of the "mason wasps", Eumenidae, along with the nests of the praying-mantis. Up in the trees the white-faced hornet, Vespula maculata, has built its grey paper-like nest, a very durable residence. Occasionally among the twigs of a tree the entomologist finds a cocoon of a moth, while under logs and leaves, he must look for the chrysalids of butterflies. One lepidopterous insect, the Bagworm, is commonly found hanging in its nest of Cedar or Pine needles, especially in trees of the Black Locust, Robinia pseudacacia.

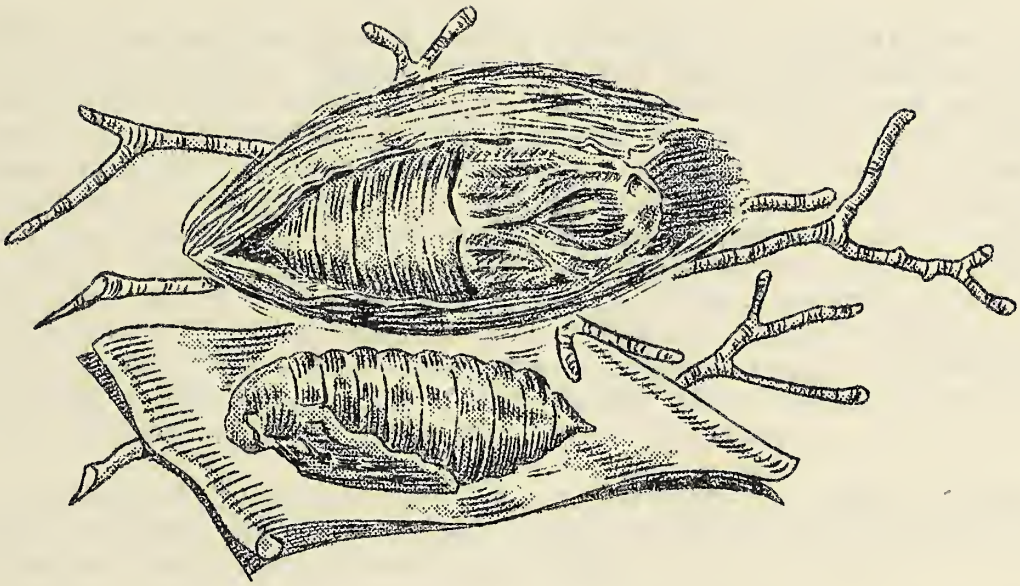
But, why the knife and cyanide bottle? Brushing the snow aside from a log, the "winter" entomologist finds a haven awaiting him. With the log fully exposed, the first operation is to slide the knife under the bark at a convenient place, and loosen it. Immediately under the bark is a layer of pulverized wood, caused in part by bacterial decaying of the wood fibre, and in part by the masticatory action of various types of larvae.

Beetle larvae are the predominate type found under bark in winter. They have a pair of cutting mandibles, by which they are enabled to chew the wood fibre, and form tunnels behind them. Some species of beetle larvae will make a chamber at the end of the tunnel where they remain until they transform into an adult. Besides well-formed mandibles, the beetle larva can be identified by its yellowish to yellowish-brown cylindrical or flattish body, and of course, the six true legs on the anterior portion of its segmented body.

Along the tunnels hibernate many species of insects, including beetles, wasps, flies and heteropterous insects. Microscopic insects infest these tunnels also, chief of which belong to the following orders, -- Homoptera, Lepidoptera and Thysanoptera.

Among the beetles the following families are usually found in hibernation under the bark of trees: Carabidae, or ground-beetles; Scarabaeidae, the scarab beetles; Passalidae represented by its lone Passalus cornutus, a large black common beetle; Carambycidae, the long-horn beetles; Buprestidae, the metallic wood-boring beetles; Elateridae, the click-beetles; Cicindelidae, the tiger-beetles; and innumberable minute beetles and weevils. In water soaked logs in streams may be found Hydrophilidae, the water beetles.

In the order Hymenoptera, including wasps, bees and ants are to be found green and blue wood-boring bees, all stages of development from egg to adult being present in cup like capsules under the bark of dead trees and stumps. In hibernation are Vespula maculata, the white-faced Hornet; Vespula diabolica and relatives, the yellow-jackets; as well as innumerable wasps of the superfamilies Vespoidea, Ichneumonoidea, Sphecoidea and Chalcidoidea. Of the ants, Formiciodea, the solitary varieties



(Natural Size)

Cocoon of Samia Cecropia Cut Open to Show Pupa Inside.

This large silken cocoon is frequently found by the collector in winter. Because of its size, it is easily seen after the leaves of the tree or shrub to which it is attached have fallen.

hibernate alone; while the social varieties cluster together in a cavity under the bark and hibernate there. Ants may also be found feeding in beetle tunnels, on fungi growing there, even in winter.

The larvae of flies or Diptera are not common under bark, few of these creamy fat worm-like creatures dark-faced, soft-bodied being found there. Of the adults few are found in hibernation.

Also various species of the true bugs, Heteroptera, hibernate as adults under the bark of stumps and logs and associated with them are cocoons and adults of moths. Inside rotted trees can be found termites, Isoptera, along with all their castes.

Under thin barked trees, like Sycamore, hibernate cucujid beetles, and spiders. While spiders are not true insects, since they have eight legs and not six, the entomologist may make the following observations concerning their nests. Of those under bark there are two predominate types. One is the silk capsule which surrounds its inhabitant and usually hangs free along the bark; and the other is a semi-sphere, attached as if it were a concave watch glass fixed by means of silk to the bark. Incidentally, out in the open, in the field, the winter spider's nest is globular to jug-shaped suspended by silk fibres to shrubs and dead plants like the ground-cherry, Solanium. To return to spider nests under bark, often one finds silk woven nests with stones or sticks used to strengthen the capsules.

In an old stump where the lower portion is water soaked, the insect hunter may find other forms related to insects such as centipedes, myriopods, and sow-bugs.

I have explained many of the insects and related forms the collector has found, but I did not mention what he does with them. The nests he puts in paper sacks, later to be placed into boxes and labeled appropriately. Larvae, eggs and pupae are put in another sack along with some of the log, all of which are transferred at home to glass jars. Dormant or living insects are put into the cyanide bottle; they will be mounted and pinned later.

Forms of insects may also be found in winter by digging. Larvae of butterflies, grubs or June bugs, or the Japanese beetle, or grasshopper and cricket instars, as well as those of the annual Locust will often be unearthed.

Sometimes, a dip of the hand down among the leaves in the bottom of ponds will bring up nymphs of dragonflies, Odonata. Although dormant, after lying on the collector's hand for a few minutes, they will move, and finally jump off, back into the water. In the pond, small water beetles will also be seen moving about.

It is evident from the above notes that the entomologist need not stop collecting activities in the winter. Over five hundred insects collected this winter by the author bear witness to these facts.

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YELLOWSTONE NATIONAL PARK
THE GREAT WILDLIFE REFUGE

By A. Llewellyn Jones

Many of us who have never visited Yellowstone Park, think of it as a land of spouting geysers. Few, if I may hazard a guess, realize that Yellowstone National Park is one of the largest and most successful wildlife refuges in the world. For this reason it is also an excellent and accessible field for nature study.

Its 3,437 square miles of mountains and valleys remain nearly as nature made them. The more than 300 miles of roads, and the hotels, lodges, and auto camps are as nothing in this immense wilderness. No tree has been cut except when absolutely necessary for road, trail, or camp. No herds of domestic animals invade its valleys. Visitors for the most part keep to the beaten road, and the wild animals have learned through the years that they mean them no harm. To be sure, they are not always seen by the people in automobiles which move from point to point daily during the season; but the quiet watcher on the trails may see deer and bear and elk and antelope and he may even see mountain sheep, moose, and bison by journeying on foot or by horseback into their distant retreats. In the fall and spring, when the crowds are absent, wild deer gather in great numbers around headquarters to crop the grass.

Thus one of the most interesting lessons from the Yellowstone is that wild animals are fearful and dangerous only when treated as game or as enemies. Even the big grizzlies, which are generally believed to be ferocious, are proved by experience in national parks to be inoffensive if not molested. When attacked, however, they become fierce antagonists.

It is not only dangerous but contrary to the park regulations to feed, molest, touch or tease the bears. The brown, cinnamon, and black bears, which are the color phases of the one species- the blondes and brunettes of the same family so to speak- are numerous in the park. While apparently friendly, it should be remembered that these bears, too, are wild animals and should be treated as such.

This wild animal paradise contains several thousand elk, a few hundred moose, many deer and antelope, numberous bands of mountain sheep, and a herd of approximately a thousand bison.

The buffalo range is in the extreme eastern section of the park away from the main traveled highways and is not accessible to the summer visitors, except those using the trails for horseback trips. In order that the visitors may see some of these animals a special show herd is provided on Antelope Creek.

Yellowstone is an excellent bird sanctuary also, where more than 200 species live natural undisturbed lives. Eagles may be seen among the crags. Wild geese and ducks are found in profusion. Many large white swans and pelicans add to the picturesqueness of Yellowstone Lake.

Bears are seen daily in the summer at the feeding grounds at Canyon and occasionally along the roads. Moose are seen quite often, especially in the evenings. Mountain sheep are seen sometimes on Mount Washburn. Elk remain in the mountains above 8,000 feet and can usually be seen on hiking or horse-back trips. Deer are frequently along the roads and trails and antelope may nearly always be found near the north entrance. Beaver may be seen in the evenings along the ranger nature trail at Mammoth Hot Springs and at other sections in the park.

In winter, elk, mule deer, antelope and mountain sheep may be viewed at close range along the north line of the park and a lover of wild animals may be well repaid for taking a trip to the Gardiner Entrance and Mammoth Hot Springs to see them. Many persons find the animals more interesting at this season than in summer.

Note: This is the first of two articles on observations made by the author on a recent trip to Yellowstone National Park.

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MARYLAND NATURE LOG

MARYLAND'S PRIMEVAL FOREST

Virgin hemlock forest, where ancient trees lift their lofty heads high above the cool damp forest floor, where one walks on soft springy humus among straight branchless boles which stand like the columns of some temple, - can this be Maryland? It is. Along the west bank of the Youghiogheny River at Swallow Falls in Garrett County lies this pitiful remnant of our heritage. Thither must you go if you would know something of what this State of ours once was.

Here you are really in the woods. Wood stands all about you and towers above you. Trees are dominant. Even the ground is carpeted with the dead needles. The living ones filter the light, letting into these grand aisles only a soft subdued glow upon which the slender, upward- stretching saplings, depend for food. In this dusk evaporation is slow and everything is damp. These are ideal conditions for mosses and every low thing has its coating of greenery. Ferns fill in the spaces.

Through this page from the past you walk downward to the river and to the falls. Out into the bright dazzle of the sun on foaming water -- and out face to face with the glaring facts of a more recent past you come. Opposite you, on the east bank, above the weathered rock of the stream's natural channel, a great raw gash has been torn in the hillside. An old mine tunnel with sagging timbers tells the reason. And above, stretching back over the hill, a dense scrubby growth reaching scarcely above a man's head scantily clothes the thin rocky soil. This is the result of clean cutting. How far this particular tract extends I do not know, but its type ranges far eastward. The same thing can be seen in Allegheny County, in Washington, Frederick, Howard, across the bay in Queen Anne's, and doubtless,

right on through Worcester down to the naturally treeless dunes of the ocean sands.

Scrubby acres, with patient care and time they will someday grow once more into forests. But these forests we shall never see. For us remains only the hemlocks of Swallow Falls.

C. Haven Kolb, Jr.

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KNOW YOUR MUSEUM

With the exception of the deer and a few remaining bear there are no large mammals in Maryland, and because of the limited space in the Museum these two cannot be exhibited. However most of the well known medium-size mammals of Maryland are shown.

Of these the Muskrat is very important as there have been built around it a considerable industry which today is larger than the once famous oyster industry in this State. Yet strange to say but little seems to be known about this animal by the average person.

Although the muskrat is a rodent, it is not a true rat. The animal is practically speaking a vegetarian, its main article of diet being the three-square sedge and cattails, although a small percentage of animal matter is eaten; sometimes spotted, painted and musk turtles, blue crab, small fish and mussels.

The muskrat lives mainly in the water and prefers swimming to walking. It is mostly nocturnal in its activities, and when it does feed in daylight it is usually between sunset and dusk.

The animal will thrive where there is abundance of suitable vegetation, with plenty of fresh or brackish water and a bottom with at least six inches of peaty remains. Ordinary cold weather does not affect it, though severe winters, when the marshes are frozen over for a month or more, have serious results.

Muskrats build two general types of houses depending on the topography of the land. In open marshes they build a more or less dome-shaped house. In uplands they dig burrows in the sides of banks of streams. To these homes is a runway into a hole underwater, but which terminates in a series of rooms above the water line. In these rooms the four to seven young are born and reared. This apparently is the only purpose the rooms serve, as the muskrat does not store food for the winter like some of the other rodents.

The house is built of rushes and cattail stalks, on some firm foundation, such as a stump of a tree, or a clump of packed down vegetation.

There are two color phases in the muskrat, - brown and black.

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E. B. F.

NOTES FOR THE MONTH OF DECEMBER

Meetings and Lectures at the Society

December 2 - Bird Club.
6 - Talk by Mr. Herbert C. Moore, "Petroleum".
7 - Mineral Club.
13 - Lecture by Dr. Howard A. Kelly, "Diversity of Interests".
16 - Plant Club.
20 - Talk by Mr. Elias Cohen, "Snake Odours".
27 - Talk by Mr. Price Piquett, "The Part that Insects Play in the Conservation Program".

Junior Division

December 3 - Open discussion on the Jones Falls area.
10 - Lecture by Mr. Clyde F. Reed, "Geysers of the Yellowstone National Park".
17 - Lecture by Mr. Walter E. Price, Jr., "Minerals in the Growth of Civilization".
Meetings discontinued during Christmas Holidays.

Lectures, Exhibitions and School Loans

December 2 - Manchester School, Carroll County, Loan of Bird Habitat Group.
5 - Baltimore City College - Loan of Birds.
5 - Southern Evening School, General Science Demonstration and Loan of Bird Habitat Group.
6 - Fish Culturists of Maryland. Lecture at Municipal Aquarium by Mr. Elra M. Palmer, "Fossils of Maryland with Particular Emphasis on Fossil Fish".
7 - Western High School. Lecture by Mr. John B. Calder, "Fossil Life of Maryland".
11 - Field Day for Bird Study.
11 - First M. E. Church Epworth League. Lecture by Mr. Elra M. Palmer, "Prehistoric Life of Maryland".
12 - Baltimore College of Commerce, Loan of Insects.
13 - At Society. Exhibit of School loan displays in Insects.
28 - Patterson Park Junior High School, Loan of Fossils.

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CLUB NOTICE

As there are many members who would like to pursue the study of one or more nature subjects, the Society has inaugurated a series of Clubs for this purpose.

Mineral Club - First Wednesday of each month.
Bird Club - First Friday of each month.
Plant Club - Second Friday of each month.
Photographic Club - Third Friday of each month.
Herpetology Club - Every Saturday at 7:00 P. M.

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The Natural History Society of Maryland

BULLETIN

Volume IX FEBRUARY, 1939 Number 6

THE MYSTERIOUS MIGRATION

The Strange Midnight March of a Species of Tropical Land Crab Which Ends in Death and New Life

By Gilbert C. Klingel

Because of a wedding in which I had neither part nor interest, it came to pass that I saw a very wonderful thing. The wedding began, like so many tropical island weddings, early in the evening and ended in the early hours of the morning. It took place in a little stone and thatch hut on the lonely island of Inagua in the Bahamas where I was spending time doing some research for the Society, and celebrated the climax of a romance, somewhat gone stale, between a native woman called Celestina and a black boy named George.

Although I had no interest whatsoever in the affair, the noise of the celebrants, augmented by a pair of monstrous drums and an accordion, kept me awake until the small hours of the morning. Finally I could stand the din no longer; and, weary from hours of tossing to and fro listening to the brain-fever repetitions of the drums I donned shoes and shorts and went out into the moonlight. For a time I wandered aimlessly about and then turned into a little trail that wound down to the seashore.

Presently I emerged from a great bed of cactus and prickly pear near a huge mound of rocks on the very edge of the sea. Here the surf was sliding up very gentle, slithering in long creeping fingers between the rocks, etched in vivid highlight by the gleam of the moon. Far away I could hear the pulsations and shouts from Celestina's wedding but these sounds were no longer of any importance. Instead the roar and sigh of the gently rising surf occupied my half conscious hearing. Swish and sigh, it said, swish and sigh again, steadily, like a faint watery metronome beating away the time. For the first time that evening I felt soothed and dropped into a heavy sleep.

On and on I dozed and did not stir for nearly an hour. But presently into my half conscious senses there crept a multitude of little sounds that I had not heard before -- faint scratchings and clatterings, queer little noises barely audible above the surf. Once a mockingbird in the bay-lavender, back of the beach broke into liquid melody, trilled half-heartedly, and then lapsed into silence. But the scratchings continued.

Presently they became more frequent, more pronounced. I raised my head. Up on the white beach, gleaming silver in the moonlight, were moving small shadowy forms. In long windrows they were gliding out of the dark bushes and creeping down to the surf. Down to the furthest reachings they went and did not pause. Faintly I could see the glisten of the salt water as it reached their bodies and drenched them with its coolness. For a second their forms showed half smothered in foam and then they disappeared. It was their clattering over the seashells that had awakened me.

It was some moments before I realized the full signifigence of what I was watching. The shadowy forms were crabs -- not the crabs of the beach or the dark blue water -- but land crabs, queer round bodied creatures that lived in holes far back in the interior. They did not belong on the seashore but had their being on those dry portions of this tropical island where big cactii reared their heads above the soil. There were two kinds of land crabs on the island -- small purple crustaceans about as big in body as a clenched fist and big yellow fellows with tremendous saffron claws. I had seen them miles from the seashore rambling about the jungle at night seeking the twigs and bits of green vegetation on which they feed. But they had not been visible lately -- it had not rained for some time and they were keeping close to their holes, sleeping away the hours in drowsy somnolence. Back in the interior it had become very dry and the dust rose as one walked.

Strange that they should be here on the beach. I looked again. In a continual stream they were pouring out of the bushes and sidling down to the sea. There must have been hundreds of them; and there seemed to be an air about them of something very important, something that would not be brooked. Even when I jumped to my feet and strode up to the sand they did not pause but merely sidled to one side and continued down to the surf. Then I knew.

Far back in the hinterland of the island, miles away, it had rained that day, a downpouring drenching tropical rain that filled the dry salinas to overflowing and had flooded the hollows. The rain had lasted for several hours and had turned the feathery dust into slimy slippery mud. This then was what the crabs had been waiting for, hidden deep in the cavities of their holes. And when the precious water came down, wetting their bodies and turning the land into a miniature sea, these crabs knew in some inexplainable way that their hour had come. In the countless thousands they deserted their underground houses and ventured forth into the open air. And a sudden urge had taken hold of them, all at once, an urge that with magnetic power turned them all in one direction. It was time to return to the sea.

Many moons had passed, a full year had gone since they left

their mother ocean and it was time to return. But not as they came. They were returning in the countless hundreds, pouring out of the jungle in droves, but they had come in the thousands. The beaches and bush trails had swarmed with them that July a year gone, so thick that one could scarcely walk without crushing their bodies.

They were very tiny then, barely an inch in length, and the big brown cuckoos had held joyous revel and had stuffed themselves with young crabs until they could hardly fly. They had seemingly come out of nowhere; for a few days they had swarmed and then little by little they disappeared into the jungle, into their lonely retreats into the interior. Creeping over boulders and stones, threading between the lignum vitae, under the tangled masses of the prickly pear they had made their way, meeting death and disaster in a thousand forms, growing the while -- some of them -- until the inland country had swallowed them up.

In the moonlight I cornered one of the advancing crabs -- a purple one with yellow spots -- and picked it up. Beneath the body was a great purplish mass tucked under the shelter of the apron. The crab was female and the purple mass was her eggs. She struggled to get free, bit at me with her claws. I dropped her to the sand and tried to make her go back into the bushes. But an instinct stronger than fear possessed her that night. Stepping daintily forward, moving each of her legs in consecutive precision, she menaced me with her claws and ran to pass between my feet. I let her go and she dashed the remaining distance to surf and was swallowed in the bubbles.

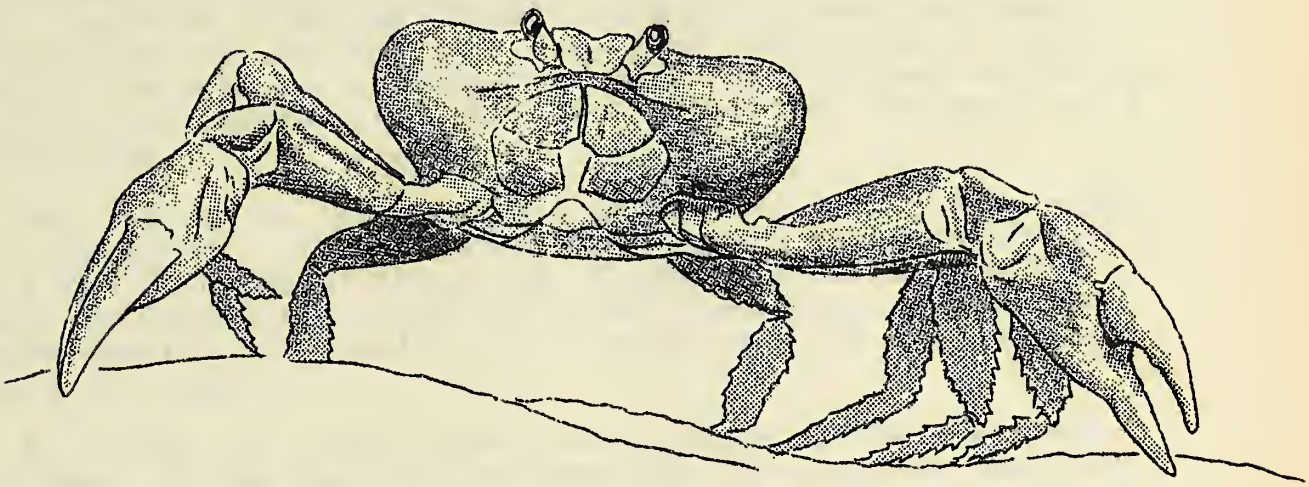
There, I knew, though I could not see it, a wonderful thing would happen. In the cool depths, in the shelter of some dark crevasse safe from hungry fishes, just beneath the area of the surf where the bubbles churned the water into silvery spray, the eggs would hatch casting forth their spawn. And the mother, exhausted by her long journey, by her year of life on dry land would die, her hour of labor finished, her destiny fulfilled.

And I also knew that in a few hours or days the sea near shore would be afloat with countless millions of tiny microcreatures, the spawn from the purple-colored eggs. Queer, gargoylish, outlandish looking spawn, that in no way could be conceived to be a crab. Scientists call these spawn Zoea, which means life; and smaller than the head of the smallest pin these transparent mosquito-like apparitions would float through the water, invisible save under a strong lens.

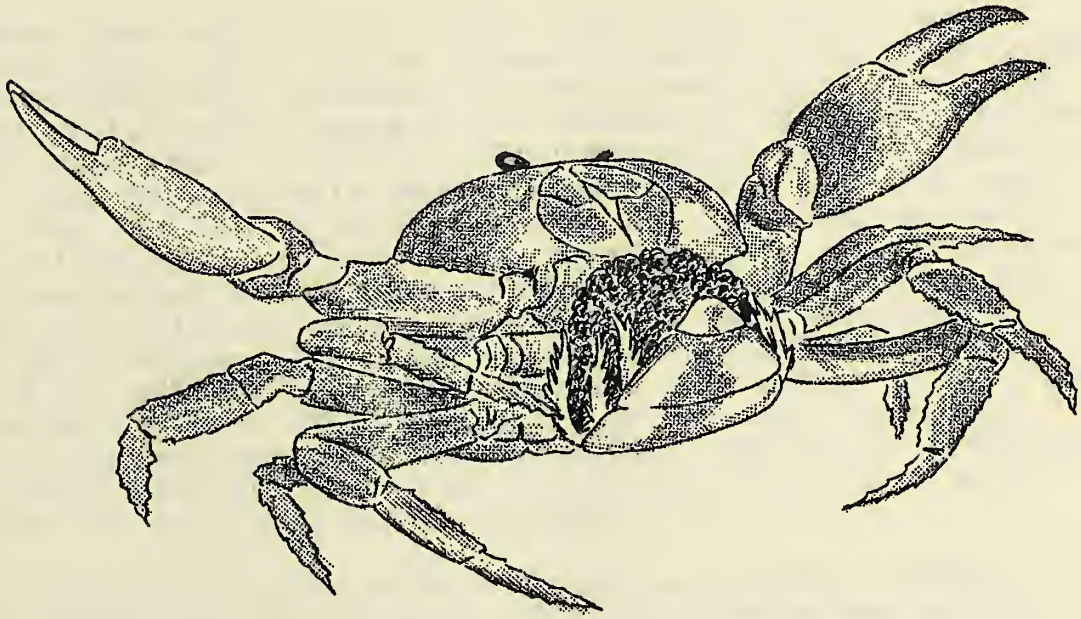
For days their function would be little more than to drift, vigorously kicking with feather-like legs, peering into the water with a big black eye, seeking the light, and devouring everything that came within reach. Hundreds would disappear down the craws of other creatures, larger than themselves and equally voracious. Other hundreds would be cast ashore to perish miserably on the dry sand, still others would be carried out to sea and be lost. But in the end there would still remain many thousands to moult their skins and change to a new form.

In this new form, retaining none of their original characteristics, they would be known as Megalops, which is to say, they

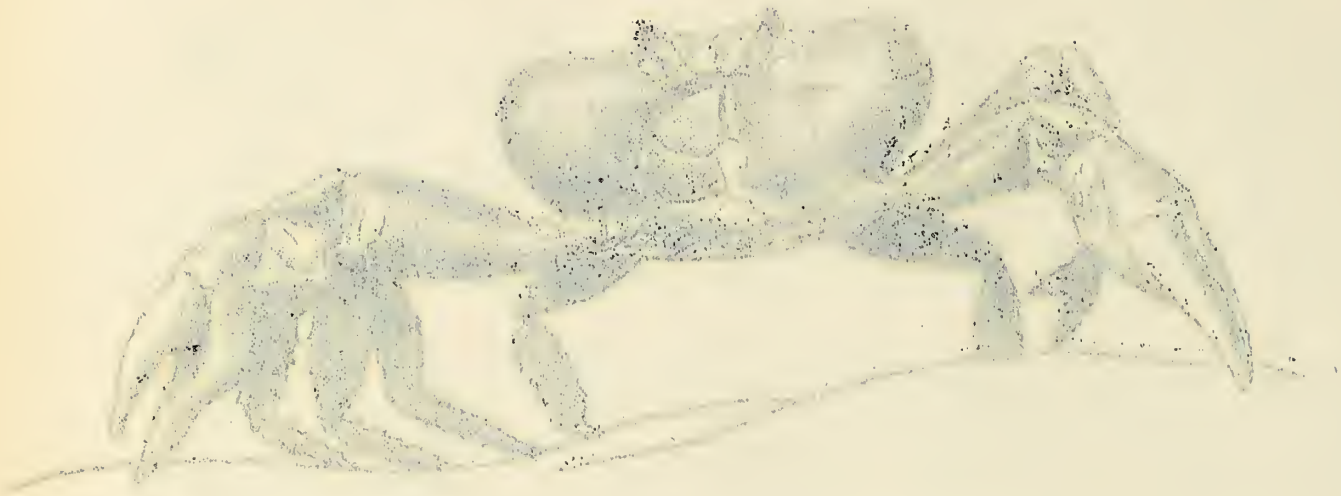
ADULT PURPLE BAHAMIAN LAND CRAB
($\times\frac{1}{2}$)

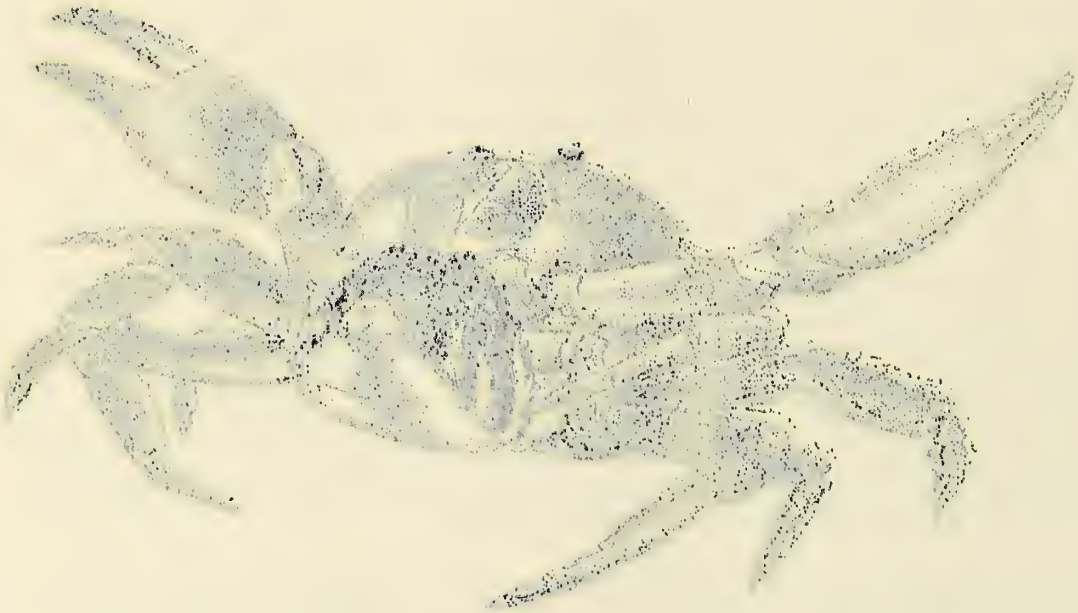


FRONT VIEW FROM GROUND LEVEL



FEMALE, SHOWING EGGS ATTACHED TO APRON





would still be outlandish looking creatures. But in this new shape they would bear some faint resemblance to a crab, although a horrible misshapen sort of crab with a wriggly tail and a pair of claws in proportion to nothing except its appetite.

In this Megalops stage the crab-to-be turns cannibal and greedily devours its younger brothers and sisters which, not so fortunate as itself, have not yet attained full megalops-hood. Nor does it satisfy itself with young zoea but munches its grotesque way through life devouring everything in sight; shedding its skin and growing the while until it moults for the last time and emerges, wet and ever so tiny, on the beach as a perfect crab.

But not yet is this midget a land crab, for that is a matter of training. Its ancestors, back in the remote centuries took a few hundreds of thousands of years to accomplish the transition from sea to land, at first clambering on the rocks of some ancient sea, poking their heads into the air and then dashing back again.

So these baby crabs repeat the history of their ancient relatives. In the dark of the evening, for they are now nocturnal and no longer seek the light, they creep up on the pure sand of the beach. But not very far. The sea is still their mother and like chicks around a hen they dash back to her for protection. And they need protection for death stalks the beach in a thousand forms. But the greatest danger is that of drying up.

Tucked away under their eighth inch bodies are a set of diminutive gills, tiny little fringed tissues hidden ingeniously away where the gritty sand may not reach and injure them. In the deeps of the water these gills had served them well, gathering the oxygen from the brine, distributing it through their tissues. And in all their babyhood these gills had been comfortably wet, nor was dryness thought of. But when the epic moment arrived when the baby crab, drawn by some unaccountable instinct struggled its way through the last inch of foam and stood wet and dripping in the open air, it must have felt a surge of well being. The gills which before had laboriously separated the water-clinging oxygen must have drunk in the free air, soaking it up in quantities. It is a cosmic thing to suddenly step from one world into another. But it is probably that the baby crab did not think it cosmic at all, for baby crabs function solely by blind instinct.

And instinct coupled with activity caused the crablet to struggle further up on dry land, fully six inches out of the surf. It must have been a terrific struggle, for remember the infant is but an eighth of an inch in length. Tiny sand grains must have been as great boulders, a half buried sea shell a veritable mountain.

But presently, back in what served the creature for a mind, comes a feeling that all is not well. There is a tight feeling around the gills, a dry, uncomfortable, oppressive sensation. Panic stricken it dashes back to the sea. Good old mother ocean; damp and cool she brings relief.

But only for a time. Soon there is a desire for the air again, for the warm wind that glides over the beach rustling the leaves back of the sand. And so, for a period the tiny creature repeats the story of its ancestry, the stepping on dry land and the returning to mother sea again. But little by little, the dry land gains ascendency in the instincts of the tiny mite; only it is not so tiny now, for it has moulted a number of times, casting aside its shell and increasing in stature. And the gills have become accustomed to the air, though they must still be kept moist.

But in time there comes a day when in a vast horde the swarming beach crabs desert the shore and step back into the dark mystery of the jungle. For them it is the crossing of their Rubicon. For a full year they will not see the ocean again, and when they return it will be to die. Many would never see it again. But dauntless they move ahead. Go inland, their instinct says, go inland to the very center of the land.

Hundreds fall by the way. Some are killed by birds, some perish by accident, falling into deep holes from which there is no escape. These die of starvation and thirst, for the islands are places of little water. Thorny cactii rear their heads above the barren rocks, and there are great areas where there is no shade at all. Only by nibbling on little twigs and on green vegetation can they secure the water they need so badly. The gills must be kept moist. Should they dry, ever so slightly, death will quickly follow.

Above all they avoid the sun. Ten minutes full exposure in the sun means certain disaster. Crabs have no sweat glands to keep them cool and when the tropical rays beat down on their purplish backs their shells become so hot they can scarcely be touched. But the crabs do not live that long. With the first sudden rise in temperature they become drowsy, their legs fold wearily under them and they fall to the ground. Once fallen they never rise again.

I discovered this quite by accident one day when I cornered a crab in an open glade. Frantically it tried to reach the shade. It even lost all fear of me and tried to scramble between my legs. But I did not know the reason for its panic and kept it in the open. Hardly three minutes had passed before its claws fell weakly to the ground and it toppled on its face. A moment later it was dead.

But out of the thousands that die by the way a certain number reach the appointed place and distribute themselves over the land. In the shade of the bushes and around the roots of the trees they excavate deep holes, long curving cavities into the soil. With their claws they dig out the loam, roll it into little balls and carry them, one at a time, to their doorways. In the warm tropic nights they go forth to feed, clipping the succulent jungle twigs and carrying them back to their dens.

In the months that follow they grow, casting aside their shells, becoming more and more gargoylish in appearance. By November they are fully adult -- purplish creatures with grotesque gnome-like faces. And to make them even more weird their

eyes are set on stalks and their mouths open, not up and down but sideways.

The rainy season passes and in the weeks that follow the sun shines with tropical fierceness. The ground dries out to powdery softness and great cakes of hard mud take the place of lakes and ponds. The vegetation withers, loses its succulent greenness and becomes dry and dull. And these are the grey days for the land crabs, for they dare not venture forth to feed. Only in the cool of their holes is there moisture enough to keep alive. February glides into March and March into April. The sun becomes more intense and only the cactii appear to remain green and fresh.

Particularly do the females need the damp for they have become laden with eggs. In great purple masses they hang beneath their aprons. There are hundreds of them, each about the size of a pin head, all glued together in viscid mass. It is time to go -- if only the rains would come.

A female stirs in her burrow. There is a feeling in the air. Off in the distance great dark clouds are forming, gathering in sullen mass. Thunder rolls fitfully and dies away. The trade wind is gone and the air is still -- very quiet and heavy. It is terribly hot; across the salinas the heat waves are dancing making queer images. The clouds pile up, higher and higher, jet black in the middle. Thunder again. The sun drops towards the horizon tinging the world with refulgent gold. From the direction of the clouds a new odor drifts across the jungle. It smells fresh and green and cool. Suddenly from the gathering darkness there comes a rush of cold rain and in a pouring drowning deluge the water beats into the soil.

Down in their burrows the crabs are frantically removing the walls of their dens. Hastily they roll aside the little pellets of brown soil and carry them away. Through the newly formed openings the water seeps in in an ever growing stream. It soaks into the soil turning the round pellets into oozy mud. The time has come at last.

In vast hordes, from far and near, the crabs break out of their dens and creep through the rain soaked vegetation. Their shells glisten with the moisture and the lightning throws their bodies into high relief.

It is the hour for which they have been waiting, day after day, week after week. Nothing turns them aside. Over rocks and vegetation, through slimy mud and tangled vines. Nor is there any mistake about direction. Somehow in some unaccountable manner each purplish body has become polarized towards the ocean. Nor does fresh water deceive them, nor the brackish pools left by the rain. It is sea water they want, the bitter salt ocean and the crashing surf. Possibly they recall in some unknown way the scenes of their grotesque babyhood when as zoea and megalops they had their being in the blue ocean. Hour after hour they move onwards nor do they stop to feed. The eggs must be spawned before the ground dries up again, the eggs that carry the whole hope of the race.

I stirred on the rocks and looked up again. Far in the east was a faint glimmer of grey and I noticed that the moon was very

low. For nearly four hours I had sat watching the crabs pouring out of the interior. Wave after wave had marched out of the jungle and had flung themselves joyously into the foam. In a few days they would all be dead, all these vast hosts of rushing crabs. Strange old mother ocean! What queer power did she hold over these errant children of hers that she should call them forth to die that they might give life again. And by what means did she guide them the weary miles out of the jungle? Was it the roar of the surf, the swish and sigh of the breakers, or some vibration too fine for human ears?

I listened intently straining for some hint. The grey in the east began to turn pink, gently, softly. Then for the first time I became aware that the drums from Celestina's wedding had ceased.

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MARYLAND NATURE LOG

PURPLE GALLINULE IN MARYLAND

On October 12, 1938, R. B. Smithers shot a gallinule on the Patuxent Marsh in lower Anne Arundel County, Maryland. The bird was sent in the flesh to the Natural History Society of Maryland. The specimen proved to be an immature female, and although we were not very familiar with gallinules in this plumage, characters of tarsi and nostrils indicated it to be a Purple Gallinule (Ionornis martinica). In January, 1939, we were able to have this identification verified by Dr. Herbert Friedmann of the United States National Museum. The coloration tallies very closely with the description given for the juvenal plumage by Bent (Bull. U. S. Nat. Mus. No. 135, p. 342). There is no indication of the dark purplish feathers which appear on the underparts in the postjuvenal molt. Thus, according to Bent's statements, the bird was probably less than two months old.

Although there are numerous records of the casual occurrence of this species north of the breeding range, it appears that no specimen has ever before been taken in Maryland. Kirkwood, in his list of Maryland birds (in Trans. Md. Acad. Sci., 1895, p. 281) speaks of one reported by Richmond to have been seen in Centre Market in Washington, D. C., from "down the Potomac somewhere". However, Cooke makes no mention of this species in her careful review of the "Birds of the Washington, D. C., Region (Pro. Bio. Soc. Wash., Vol. 42, pp.1-80). Bent (op. cit., p. 345), in a long list of casual occurrences, has no record from Maryland. Hence, it appears that this species can be added to the still inadequately inventoried avifauna of Maryland.

C. Haven Kolb, Jr.

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NOTES FOR THE MONTH OF JANUARY

Meetings and Lectures at the Society

January 3 - General Assembly.
4 - Mineral Club.
6 - Bird Club.
10 - Lecture by Dr. Littleford, "Life History of the Common Sea Nettle".
13 - Plant Club.
17 - Talk by Mr. Gilbert C. Klingel, "Adventures in Santo Domingo".
24 - Talk by Mr. Henri Seibert, "Relations of Body Structure to Health".
28 - Meeting of Board of Trustees.
31 - Talk by Mr. Charles Ostrander, "The Universe About Us".

Junior Division

January 7 - Talk by Mr. William Moorefield, "The Damage of Mound Building Ants".
7 - Meeting of Herpetological Club.
14 - Talk by Miss Justine Moulton, "Quartz".
Talk by Miss Helen Klinke, "Some of Our Fall Wild Flowers".
Talk by Miss Janet Byrns, "Domestic Cats".
14 - Meeting of Herpetological Club.
21 - Lecture by Mr. John B. Calder, "The Mound Builders of Ohio".
21 - Meeting of Herpetological Club.
28 - Talk by Mr. Louis Hughes, "Insect Adaptation".
Talk by Mr. Francis Groves, "Maryland Lizards".

Lectures, Exhibitions, and School Loans

January 11 - Hochschild, Kohn & Co., Loan of Birds and Mammals
11 - Branch No. 1, Enoch Pratt Library, Exhibition of Minerals.
17 - Western High School, Loan of Birds.
18 - Outdoor Life Federation. Exhibition of Maryland Birds.
18 - Baltimore Federal Savings and Loan Association, Loan of Bird Group and Mammals.
19 - Wymans & Co, Loan of Birds.
19 - Bonwit -Lennon. Loan of Birds.
23 - Lecture to Young People's Club, Hampden Baptist Church by Mr. George Maugans, "Reptiles of Maryland".
27 - Lecture to Boys and Girls Scout Troop at Gatch Methodist Episcopal Church by Mr. Elias Cohen, "Maryland Snakes We Should Know".
27 - Chesapeake and Potomac Telephone Company, Loan of Birds and Mammals.

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CLUB NOTICE: As there are many members who would like to pursue the study of one or more nature subjects, the Society has inaugurated a series of Clubs for this purpose.

Mineral Club - First Wednesday of each month.
Bird Club - First Friday of each month.
Plant Club - Second Friday of each month.
Photographic Club - Third Friday of each month.
Herpetology Club - Every Saturday at 7:00 P. M.

TENTH ANNIVERSARY

1929 — 1939

THE NATURAL HISTORY SOCIETY OF MARYLAND

VOL. IX — BULLETIN MARCH 1939 — No. 7

AFTER TEN YEARS

(Part of Address Delivered by the President of the Society, Edmund B. Fladung, at the Tenth Anniversary Celebration, March 25, 1939).

Today this Society commemorates its tenth anniversary. It was on this day, Maryland Day, ten years ago that the Society was founded.

In its charter the newly founded organization promised the State to increase and diffuse knowledge of Natural History, to establish a Museum and reference library, to protect wild life from needless destruction, to provide facilities for research and publication, and to pursue and foster allied sciences and endeavors.

Let us go over the work of these past ten years and see how well this Society has lived up to its promise.

Today we have a Museum. Though small, it is patterned after the larger and famous Museums of the Country. Here we have a story of Maryland, beginning with the structure of its surface, its prehistoric life, its mineral resources, its animal life in all its forms, and ending with the early inhabitants of the State. Adjoining the main hall is a beautiful group room, which when completed will teach many lessons, and will be a delight to Nature lovers. Our Museum was visited last year by 82,045 persons, a 26% increase over any previous year, and classes of school children and other organizations availed themselves of its exhibitions for study. Nature Summer Schools have been conducted ever since its opening three years ago. Through Baltimore's broadminded and farsighted Board of Park Commissioners these efforts were attained and are now bearing fruit a hundredfold.

The School Service inaugurated by the Society two years after its inception has served 48,325 children this year alone, and has reached through its various educational mediums over 794,815 persons. Courses in Nature Study have been offered to the public for the cost of materials only. A division for boys and girls has been maintained to give an outlet and impetus to endeavor in fields somewhat new to Baltimore. This division has been the beginning of Science careers for a number of young men who today are working in other institutions.

To date the Society has published besides the monthly bulletin, various leaflets and transactions. These publications have passed to nearly every State of the Union, as well as to Europe, Asia and Africa.

One of the chief key notes of this institution has always been conservation. It was one of the original founders of the Maryland Outdoor Life Federation, whose main object is conservation, and the Society has never passed an opportunity to impress upon the public the importance of wild life protection.

The Municipal Aquarium was conceived and realized by members

of this Society along with the Conservation Department of Maryland, the Board of Park Commissioners, and other public spirited organizations.

In every movement in which nature education or conservation was concerned the Society participated. Exhibitions were held at Flower shows, Outdoor Life shows, State Fairs, and Schools. Many ribbons were won and commendations were received for our excellent displays.

The relationship with the Enoch Pratt Library has been one of mutual cooperation and good will. Exhibits in the form of window displays have been a part of our yearly program.

In all these endeavors we have sought the good will of City and State agencies of every kind engaged in educational work or having control of our natural resources.

From these facts you can see how well the Society has kept its promise. You will also note that prior to the advent of the Society, these educational advantages did not exist in Baltimore. We had no aquarium, no school service, no popular nature publications, no conservation organization, no nature summer schools, no nature courses, no museum wholly devoted to the Natural History of Maryland.

These past ten years though busy and in some instances trying, have nevertheless been pleasant. All our contacts, whether Federal, State, City, private associations, or private individuals, have given us a kindly word and lent a willing hand, and today we have a host of friends too numerous to mention. The progress thus made is due to two important factors, a broadminded, business like, progressive Board of Trustees, and an enthusiastic, nature loving staff of workers.

The policy of our Board of Trustees has been one of good will to all, with definite aims, honesty of purpose and a pay as you go financial plan. The Board has seriously felt the trust that is placed in it and in consequence it has built up a Staff of interested and willing workers within the organization, and has made contacts with outside institutions to aid and further the aims of the Society.

Our Staff, a non-paid body, has labored most heartily to build up a representative collection of nature specimens of our great State, and has published its findings and results for the public in leaflets, bulletins, and transactions which have been sought by institutions famous for age and learning.

As a result today this Society ranks with such public institutions as the Enoch Pratt Library, the Baltimore Museum of Art, the Peale Museum and others of like nature.

Ten years seem a long time. To us it was a short time. What the next ten will bring I do not know, but one thing I do know, and that is, we will pursue the same policy adopted ten years ago, because it has worked well for the Society, the City of Baltimore, and the State of Maryland.

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TENTH ANNIVERSARY CELEBRATION

The members and friends of the Society who were present at the Tenth Anniversary Celebration Banquet held in Sears Community Hall on March 25th, Maryland Day, enjoyed a very pleasurable evening. Of particular interest was the address of the President of the Society, Mr. Edmund B. Fladung, who reviewed the achievements of the organization during the past ten years and pointed out how the members had worked together to carry out the purposes of the Society as set forth in its Charter and Constitution. Towards the close of the Address the President called upon the curators, associates and assistants of the various departments of the Staff to stand, which they did to the hearty applause of their fellow members and friends.

Among the shorter addresses of the evening were those of Mr. John Brandau and Mr. Richard Baker, members of the Park Board, Mr. Karl Pfeiffer, Assistant State Forester, Dr. Anita Dowell, State Teachers College, Towson, Mr. F. Stansbury Haydon, one of the seven founders of the Society and Mr. Elra M. Palmer, Director of the Society's Department of Education.

Dr. Howard A. Kelly, who was in Florida, Dr. Joseph L. Wheeler, Mayor Howard Jackson, and Dr. R. V. Truitt, fellow members, who were unable to attend the Celebration, sent letters or telegrams of regret and felicitation, which were read by the Toastmaster, Mr. Oscar Helm.

The program of entertainment included, in addition to group singing in which all participated, piano solos by Mr. Clyde F. Reed, of the Department of Entomology, several selections sung by Mrs. John W. Bailey, accompanied by Miss Henrikka Whelan, a violin solo by Mr. Elias Cohen, accompanied by Miss Janet Byrns, both representatives of the Junior Division of the Society, and several unique Indian dances by Mr. Andrew Goss and Mr. Jack Zeiler, who were arrayed in Indian finery.

An interesting lecture, "Indian Tribes of North America" illustrated with motion pictures, by Mr. Benjamin Kurtz of the National Museum, concluded the program.

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SOME QUESTIONS ON *EUMECES* IN MARYLAND

By William H. McClellan, S.J.

The following notes may suggest some questions for further observation.

How should English names be revised?

Until rather recently a species of skink then known as *Eumeces quinquelineatus* (Linn.) was commonly thought to be the only member of its genus occurring in Maryland. The study of the subject was but little advanced, even in the phase of field work. The first basis of distinction---comparative size---was thought to be only regional. In 1908 Ditmars, describing a supposed ex-

ample of this species as 9½ inches long, remarked that "it is only in the Southern States that the species attains such large proportions." To the writer of these notes (never a "full time" herpetologist) the first misgiving came in 1932, through a St. Mary's County specimen whose coloration as well as size was at variance with the whole experience of ten years' collecting. By that time, however, technical herpetologists were already better informed. All are now aware that Eumeces is represented in Maryland by two certainly indigenous species, and also that the name quinquelineatus has been abandoned. Of the two native forms E. fasciatus it the smaller and commoner, E. laticeps the larger and less familiar.

Professor E. H. Taylor's monograph "The Genus Eumeces" is now the standard work on its subject. Besides recognizing fasciatus and laticeps as certainly native to Maryland, his records of distribution suggest as possible the occasional intrusion of two neighboring species, E. inexpectatus, which is known from Norfolk County, Virginia, and E. anthracinus, which seems to follow the highlands of Pennsylvania as far south as Carlisle, and is once recorded from Allegany County, Maryland. Since this last has a very restricted localization in the Atlantic States, and since inexpectatus has not yet been recorded as far north as the Potomac, we may for the present leave them out of consideration for Maryland as a whole.

As laticeps and fasciatus now divide the familiar field between them, it may not be idle to discuss some revision of English names for ordinary reference. "Five-lined" was formerly adopted as the obvious translation of quinquelineatus, but the latter designation has been dropped. It is simple enough to call laticeps "the broad-headed skink" for general purposes. The problem is that of an appropriate name for fasciatus. Apart from the abandonment of its Latin original, the name "five-lined" should hardly be retained. Taylor's phylogenetic tree shows no fewer than thirty species of Eumeces characterized by five longitudinal lines, so that the older name is not distinctive. To translate fasciatus as simply "striped" would be even less so.

However, fasciatus seems to enjoy the distinction of a wider distribution than that of any other in North America. Hence, for common parlance the name "Common Skink" would seem appropriate enough. Its fitness even transcends the genus Eumeces. The latter by no means exhausts the scincoid type in North America, or even in Maryland; yet in both together E. fasciatus must be the most widely known of skinks.

Winter quarters of Eumeces fasciatus

In 1937 I hunted the Common Skink so early in the spring that the specimens found were in all probability still hibernating. At Leonardtown, St. Mary's County, three adult males were taken under these conditions.

The first I did not see when actually uncovered. Two Boy Scouts took it on March 28, during a windy afternoon with a temperature of 48°. The head and body measured 73 mm. The total length remained 6 inches after about 1 inch (by inference) of the tail had been lost in capturing. I inspected the splintered

remains of the stump, a small one of red oak, which seemed to have stood originally about 18 inches high and 8 or 10 in diameter. The lizard had been found within the pulp, a few inches above the roots, on the southeastern side of the stump, but how deep within it I cannot say.

The next day, March 29, was clear and windy, about 40° to 45° in temperature. At about 10.30 a. m. we found another male fasciatus in a decayed red oak stump about 2 feet high by a foot in diameter. The stump was riddled with burrows of larvae of the stag beetle; most of its wood was decayed, but some very firm, and most of its exterior still covered with bark. Again the lizard was on the southeastern side when uncovered, but active enough to crawl through a burrow to the support of some bark on the opposite surface. This specimen was intact, measuring 6½ inches, the head and body 60 mm.

Late in the afternoon of this date, in a temperature of about 60°, the third was found. It measured 6¾ inches in all, the head and body 65 mm. Its shelter was a long red oak log fully 2 feet in diameter. The shell of hard wood, denuded of bark, was almost filled with soft pulp, but was split in many places, and its bottom perforated by one large cavity where the lower surface was raised a few inches above ground. The lizard lay near this cavity, at the very bottom of the interior pulp.

It should be remarked that a spell of slightly warmer weather had already come and gone, the cooler period setting in on the evening of the 24th. Hence it is possible that these three situations were all temporary shelters taken up after hibernation had ceased and some activity begun. That they had been the winter quarters is only probable. As such, they would have exposed their occupants to almost freezing temperatures. The pulp of the log last mentioned made our hands ache after a few minutes' digging. Considering, however, the earliness of the date, the fact that the season had been backward, and the apparent absence of other serviceable wintering places in the immediate vicinity (especially of the first case), this account of the circumstances may be worth presenting.

Does the color pattern of laticeps vary with the season?

Unlike that of fasciatus, the mature form of laticeps (at least in southern Maryland) is strongly striped in both sexes. The male has the typical red head together with the longitudinal lines of the body. The first specimen I ever handled, on July 18, 1932, is recorded with "some tendency to a dull red about the head, though the body lines are too distinct for any but the female" (of fasciatus). When the red had deepened later in the summer, the lines remained as distinct as ever. "The dorsal line," continues the above record, "is obscure against a rather pale background, while the second and third lines on each side (dorsolateral and lateral) enclose an area of rich dark brown." This specimen measured 10 inches. Two years later a female 10½ inches long, secured by one of our students, and recorded by photographs, exhibited the same pattern without any redness of the head. This specimen was also taken in the middle of July.

This conspicuous striping in both the sexes has occasioned some perplexity in identifying a later specimen now preserved at Woodstock College. The head is faintly red, as of a male just about mature. Head and body measure 98 mm., and the total length is 10 ¼ inches even with the last ¾ inch of the tail regenerate. In addition to these proportions, which seem to exclude fasciatus decisevly, the most conspicuous diagnostic characters seem to point to laticeps. But the stripes are totally absent, as well as the strong variations of ground color between them. The whole dorsal and lateral coloration of body and tail is uniform olive brown---as in the normal adult male fasciatus---with only a very narrow and faintly pale marginal line between this and the ventral hue.

This lizard, taken in St. Mary's County in 1938, would seem to be a specimen of laticeps (though the decision is still sub judice). The absence of the characteristic stripes suggests a question or two. It was captured on May 8, on a cool and cloudy afternoon in an exceptionally backward season, and was dug out of thick pulp at the bottom of a large red oak log in advanced decay. It was chloroformed and preserved the same day to facilitate transfer. It is possibly an old male laticeps in what might be called a "winter moult", and would the normal stripes have re-appeared, with successive sloughing, as the summer advanced? Or ---as an alternative hypothesis---does the male of laticeps in its earlier maturity pass through a color stage resembling that of the mature male fasciatus, and was this a young male laticeps, with its growth accelerated by abundant feeding, and destined only later to acquire the striped pattern of full maturity?

Perhaps better informed collectors may be able to bring more abundant data to bear upon these questions.

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KNOW YOUR MUSEUM

MARYLAND HAWKS

Of all our birds, the hawks and owls are considered by persons generally as enemies. To acquaint the public with the special merits of these birds, especially the hawks, an exhibit has been placed in the Museum, with reference to their good as well as evil to mankind.

There are sixteen species of hawks in Maryland . Of these, five are comparatively rare and consequently of little economic importance.

We will discuss the merits and demerits of the others. Of the eleven common members of this hawk group, two are entirely scavengers; namely, the vultures. The Bald Eagle is chiefly a scavenger, eating carrion, some fish and small animals, mostly those that are sick or crippled. Another, the Osprey, lives chiefly on non-commercial fish.

This brings us to the seven remaining common hawks. Of these, two, the Broad-winged Hawk and the Sparrow Hawk do not kill poultry. Their main diet consists of insects, snakes, rats,

mice, frogs, and a very small percentage of small birds and game.

The next hawk, the Red-shouldered, attacks poultry to the extent of 1.4%, game birds 1.8% and small birds 6.5%. In the same category should be placed the Red-tailed Hawk with 6.3% of poultry and 9.2% of small birds. This gives these birds a large percentage of good to their credit, 90% and 73% respectively.

This leaves three Hawks; the Marsh Hawk with 36% good to its credit in the form of rats, mice and insects consumed. Of the damage done by this bird 57% is to small birds and game, with only 2.3% to poultry. So this bird is not a serious menace to man, although it is not as beneficial as some of the other hawks.

The Sharp-shinned Hawk with only an average of about 3% good, affects man directly to the extent of .2%. Its chief damage is done to small birds (96%).

The last hawk, and the one most injurious to man is the Cooper's Hawk. This has to its ill repute 10% of poultry, nearly 14% of game, and 55% small birds.

From these notes one can see that the hawks as a class show a greater balance in their favor than otherwise and should be protected.

Chart Showing Per Cent of Good and
Evil Done by Seven Common Hawks

	Beneficial To Man			Not Directly Affecting Man				Injurious To Man		
HAWKS	RATS AND MICE	INSECTS	TOTAL %	REPTILES AND AMPHIBIANS	MARINE	SMALL BIRDS	TOTAL %	GAME	POULTRY	TOTAL %
SPARROW HAWK	20.3	63.5	83.8	7.8	0	8.4	16.2	0	0	0
BROAD-WINGED HAWK	23.	39.7	62.7	30.9	2.	3.4	36.3	1.	0	1.
SHARP-SHINNED HAWK	2.6	.7	3.3	.1	0	96.4	96.5	.1	.1	.2
RED-SHOULDERED HAWK	28.	32.	60.	25.	5.3	6.5	36.8	1.8	1.4	3.2
RED-TAILED HAWK	55.	10.5	65.5	6.	1.6	9.2	16.8	11.4	6.3	17.7
MARSH HAWK	33.	3.3	36.3	4.1	.1	41.	45.2	16.2	2.3	18.5
COOPERS HAWK	17.	3.3	20.3	1.	0	55.	56.	13.7	10.	23.7
AVERAGES	25.5	21.8	47.3	10.7	1.3	31.3	43.3	6.3	3.	9.3

E. B. F.

A NOTE ON THE HOMING INSTINCT OF THE MOURNING DOVE AT THE CATONSVILLE BANDING STATION

One of the most remarkable notes made at our banding station in Catonsville, Maryland, is the instance of the well known homing instinct shown by the Mourning Doves.

About five years ago twenty-four birds of this species were banded at the station. Of these, twelve returned the following year. To show how remarkable this was, it may be mentioned that the usual average of returns, all species, is one bird in twenty.

Unfortunately a plague broke out among the doves and swept the old flock off. Four banded birds were found dying at the station.

Since then the returns from the more recently banded birds have been nearly as good, the best being a bird which has returned four times, besides several repeats having returned regularly for four years.

Edward McColgan

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NOTES FOR THE MONTH OF FEBRUARY

Meetings and Lectures at the Society

February 7 - Lecture by Dr. Burton E. Livingston, "Ways of Watering Plants".
8 - Mineral Club.
10 - Bird Club.
14 - General Assembly
17 - Plant Club
21 - General Assembly
28 - Talk by Mr. Howard Owens, "A North Canadian Expedition".

Junior Division

February 3 - Herpetological Club - special meeting.
4 - Lecture by Mr. George Maugans, "Energy in Nature".
4 - Herpetological Club.
11 - Talk by Miss Ruth Fishpaugh, "Amethysts".
11 - Herpetological Club.
17 - 25 - Outdoor Life Show - First prize, Birds' nests won by Theodore Mattern; second prize, Insects, won by James Benzinger.
18 - General Discussion on Biological Survey.
18 - Herpetological Club.
25 - Herpetological Club.
26 - Lecture by Miss Mary Anne Douglas, "Astronomy". Lecture by Miss Katherine Paila, "Fossils", for Natural History Group, State Teachers' College.

Lectures, Exhibitions and School Loans

February 3 - Fork School, Loan of Minerals.
9 - Lecture to Parents' Teachers' Association, School No. 63, by Mr. Irving E. Hampe, "Our Winter Birds".
17 - 25 - Outdoor Life Show. Five Exhibits of Insects, and Bird Group entitled, "First Snow Fall". Six First prizes awarded Society.
24 - To St. Anthony's Parochial School, Loan of Indian Artifacts..
26 - To St. Anthony's Parochial School, Loan of Insects.
27 - Troop 13, Boy Scouts America, Loan of Birds.

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CLUB NOTICES

As there are many members who would like to pursue the study of one or more nature subjects, the Society has inaugurated a series of Clubs for this purpose.

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The Natural History Society of Maryland

BULLETIN

Volume IX APRIL, 1939 Number 8

GROWING ORDINARY PLANTS WITHOUT SOIL, IN SOLUTION CULTURE

By Burton E. Livingston
Director, Laboratory of Plant Physiology
The Johns Hopkins University

Foreword

Although most growers of house plants have long been familiar with the forcing of hyacinth and narcissus blooms from bulbs supported over glasses or in pans of water, and with the occasional indoor water culture of English ivy and some other plants, it is only within the last decade that the growing of many kinds of common plants in solution culture has attracted extensive public attention in this country. The sudden awakening of general interest in these simple operations was due largely to popular accounts, in newspapers and magazines, of Dr. W. F. Gericke's first large-scale solution cultures, which he carried out near Berkeley, California. Engrossed in his exciting experiments (and apparently without too much encouragement from other people at first), Dr. Gericke has thus far published very little about his cultures, and professional students of horticulture as well as plant growers and amateur gardeners were at first dependent upon popular accounts for most of their information. An increasing number of commercial growers and some agricultural experiment stations soon started large-scale experiments of this kind and a number of stations eventually prepared circulars on solution culture, to be sent out in reply to the thousands of enquiries that were received. Because popular writers, unacquainted with the history and fundamental principles of solution-culture, had made some extravagant and unwarranted predictions for both the commercial and domestic future of this novel technique, many plant physiologists were inclined to assume a general attitude of skepticism. It thus came about that many of the few writers who were familiar with small-scale solution culture in laboratory experimentation seemed to oppose the spread of this new popular enthusiasm and emphasized the difficulties of

solution culture, while a number of people without special knowledge or experience in this field gained the mistaken impression that solution culture (called hydroponics--Greek for water culture--by Dr. Gericke) was something basically new and might lead to a great revolution in agriculture and horticulture.

To understand the principles of solution culture it is first desirable to appreciate the fact--well established since about 1860--that ordinary plants with their roots in soil derive water and mineral nutrients from the soil solution rather than directly from the solid soil particles. Naturally the dissolved mineral salts of the soil solution are mainly derived, in turn, from the solid particles, but substances must of course be in solution before they may enter plant roots, and therefore the solid particles are of no immediate and direct importance as far as plant nutrition is concerned. When fertilizers are added to a soil they may improve its structure and its capacity to absorb and retain water but their main effect is frequently to increase the concentration of nutrient substances dissolved in the soil solution. In the ordinary sense productive soils are commonly three-phase systems, the solid phase being represented by the solid particles while the liquid phase and the gas phase are represented by the soil solution and by whatever gas bubbles or gas masses may be present. When a mass of soil is completely saturated with water there is no gas phase and when it is air-dry there is no liquid phase. A jar or tank of nutrient solution may be regarded as a soil without either gas phase or solid phase; the entire volume of such a "soil" being occupied by the soil solution.

Waters of wells, springs, rivers and lakes are essentially natural soil extracts, which hold as solutes various substances derived from solid soil particles. When they carry undissolved solid particles these tend generally to settle out, and contained gas bubbles tend to escape upward into the atmosphere. Some kinds of plants--notably various algae and such small flowering forms as duckweed (Lemna, etc.)--thrive in natural ponds and lakes without any contact with the saturated soil below. Colonies of these represent natural solution cultures. A floating plant or duckweed is supported by its bouyancy at the surface of watery solution and its roots extend down into the solution, deriving mineral nutrients therefrom.

That plants which commonly grow with their root systems in moist or wet soil might thrive in solution culture was surmised as early as 1699, when Woodward described experiments in which he had grown such plants as spearmint, potato and vetch in clear water from several natural sources. About fifty years later Duhamel du Monceau grew beans to maturity in filtered water from the River Seine and cultured an oak seedling in that medium for at least eight years, at the end of which time it was about 18 inches tall. In 1804 de Saussure published an account of solution-culture experiments with spotted knotweed (Polygonum persicaria) and other plants.* By 1870 the method of solution culture was

*Some interesting references to very early studies are the following: Woodward, J. Thoughts and experiments on vegetation. Phil. Trans. Roy. Soc. London 21: 382--398. 1699.--Duhamel du Monceau, H. L. La physique des arbres. Paris, 1758.--de Saussure, Th. Recherches chimiques sur la vegetation. Paris, 1804.

generally employed in numerous studies on the mineral nutrition of plants, especially in the hands of such pioneers as W. Knop, Julius Sachs and F. Nobbe, and the employment of that method has continued to give an ever-increasing fund of valuable information in the hands of physiologists and agricultural chemists.

It was early pointed out that, although field experiments and cultures in pots of soil were most useful for practical purposes (when one wished to find out how to grow healthy plants rather than how healthy plants grow), yet solution culture offered the only means by which an experimenter might have satisfactory knowledge about his experimental root environments. Therefore, those whose main interest lay in physiology were likely to use distilled-water solutions of various known salts in various known proportions and concentrations, while those whose studies were directed more toward improvement in agriculture and horticulture frequently worked with soils to which various substances were added. Practically minded people tended to regard solution cultures as largely waste of time and energy, holding that no one ought to care very much about the growth of ordinary plants in liquid media, since plants are not thus grown in general practice. On the other hand, phsyiologists were aware that the fundamental principles of their science cannot be studied satisfactorily unless the influential conditions of experimental root environments are quantitatively known and specified to a considerable degree of precision, and that such precision may be much more nearly approached for liquid media than for soils. Both of these experimental methods have been valuable, each in its place; one is generally suitable for studies undertaken with the aim of improving the art of plant husbandry as commonly practiced and for gaining knowledge concerning the influence of soils on plant growth, while the other is suitable for studies in the scientific field of plant nutrition. Cultures in more or less nearly saturated sand or fine gravel, to which definitely specified artificial nutrient solutions may be supplied, serve as a sort of compromise, not so "practical" as soil cultures and not always so"scientific" as solution cultures.

It was also soon realized that, while the ordinary soil solution continually receives additions of soluble substances from the solid phase, as the solutes in the solution become depleted through plant absorption or through leaching, any artificial nutrient solution must be frequently renewed to avoid effective depletion and alteration of acidity due to plant absorption. According to the size of the culture vessel used, according to the plant or plants growing in it and according to prevailing climatic or weather conditions, a jar of nutrient solution is emptied and refilled with a new charge of solution every few days, every week, etc., and water or solutes are sometimes added in the intervals between renewals. For most satisfactory maintenance of the nutrient solution, continuous flow through the culture jar is frequently employed, new solution being allowed to pass slowly into the jar while the liquid level within the jar is maintained by means of an overflow tube. Culture jars vary in size, sometimes quart bottles are used, sometimes earthenware crocks holding as much as ten gallons or more. It is interesting to note, in passing, that students of root physiology have recently developed refined solution-culture methods for growing tiny excised root tips of ordinary plant forms into large root systems, in the complete absence of stems and leaves; this development has been wholly in-

dependent of the development of hydroponics.

It is thus clear that no new principles are involved in large--scale solution cultures such as those of Dr. Gericke, but the details of hydroponical technique are naturally less exacting than those of small experimental solution cultures. The relatively simple and generally satisfactory methods of hydroponics now offer to plant growers and amateur gardeners a new means for simply growing plants, for applying the principles of mineral nutrition in interesting ways and for the comparative study of the nutrient requirements of different kinds of plants under various conditions of light and temperature.

The new gardening technique is now welcomed by every one, as a valuable and interesting addition to soil and sand culture for the growing of common plants in garden and greenhouse. Still in the experimental stage, it has already proved highly satisfactory in the commercial growing of tomatoes and other vegetables and of ornamentals, in greenhouse and out of doors at many places in this country. Whatever may be its future in commercial practice, it is of special promise for amateur gardeners who wish to secure excellent garden or greenhouse plants by novel and interesting methods. It allows home gardeners to experiment in small space and at small expense, it is more interesting than ordinary culture, it involves less hard labor and more intellectual activity. It provides ready means for better control of root environments than can be secured in soil culture, especially with respect to water supply and the use of fertilizer salts; it allows the gardener to carry on in the absence of fertile soil and without risk of drought effects. As hydroponics becomes better and more generally known and appreciated, the old notion that solution cultures are "only scientific," and not "practical," is on its way to oblivion.

Amateurs and commercial growers need to realize, however, that hydroponics offers no easy cure-all for garden troubles. Although it relieves the gardener of the labor of spading, cultivating, weeding, etc., it requires frequent testing and occasional renewal of the liquid medium throughout the growing season. It also requires special equipment to replace the ordinary garden bed, but that equipment should last for many years. Fungous and bacterial diseases and insect infestations must generally receive as much attention as when soil is used--perhaps more attention in some instances, for a physiologically healthy plant is sometimes more susceptible to insect attacks, for example, than is a less vigorous plant of the same kind. In so far as methods for combatting these diseases and insect infestations in hydroponics are to be different from the protective methods employed in soil culture, such differences are to be worked out by experiment; but many "physiological" diseases or malaises (due to unsuitable supply of requisite minerals) should be combatted much more readily in the absence of the solid soil phase. The climatic relations of light and temperature must receive due attention in either form of culture. But hydroponics-grown plants may advantageously be spaced much more closely than soil-grown plants (since room for cultivation--and weed growth!--is not required), and it is much more feasible to control root temperature in a hydroponics tank than in open soil beds. Suitable electric heaters in the tanks have already been found to be very effective. It is well known that greatly improved growth may be secured, in many cases, by suitable

warming of plant roots without attempting to alter the natural fluctuation of air temperature, but the interesting relations thus suggested have never been much studied for either soil cultures or solution cultures. On the whole, the technique of hydroponics is in many respects intermediate, as it were, between the extremely special technique of physiological experimentation (with its definitely specified solutions) and the more superficial methods of soil cultures in ordinary gardening.

For outdoor application in temperate regions, the new gardening technique is best suited to the growing of annual plants or plants whose bulbs, corms, tubers or rhizomes may be conveniently stored during the winter. Thus far, perhaps tomato has been grown in large-scale solution culture more frequently than any other plant, but a very large number of other garden forms have given excellent results with this treatment, both in the open and under glass. As in other forms of gardening, a beginner may expect to encounter some partial failures, until experience shall have shown the different requirements for success with various plants in various regions.

The gardener must keep his plant roots supplied with a water solution containing the requisite mineral elements--nitrogen, potassium, phosphorus, calcium, sulphur, magnesium, iron, manganese, boron, copper and zinc. In artificial nutrient solutions these elements are generally supplied as simple inorganic salts, each of which must have its own proper concentration; in other words, the salt proportions and the total concentration of the nutrient medium must be suitably adjusted to the needs of the plants. Furthermore, the acidity of the medium must also be suitably adjusted. Fortunately, however, ordinary plants are not extremely particular about salt proportions, solution concentration or solution acidity, and these adjustments need not be made or maintained with extreme precision if our aim is simply to grow fine plants. Students of plant nutrition have recommended many different formulas for nutrient solutions, with respect to the particular salts used and their proportions, and it is clear that the proportions of the elements may vary widely, but not too widely. In general, nitrogen and potassium are found to be required in largest amounts; calcium and phosphorus, in intermediate amounts; sulphur and magnesium, in small amounts; iron, in very small amount; and manganese, boron, copper and zinc in exceedingly small amounts. Traces of such additional elements as commonly occur in productive soils should be harmless, perhaps sometimes beneficial. As to the total concentration of a good nutrient solution, it should generally be greater than that of the soil solution in productive soils but its osmotic value should generally be not much above one atmosphere. As to acidity, its pH value may generally be between 5.0 and 5.8; the color reaction of the indicator chlorphenol red should be orange or reddish orange, that of bromcresol green should be bluish green or greenish blue. These statements should apply in most cases, but they are not intended to be more than general approximations.

Because the plants act to deplete the nutrient solution and to render it less acid, the main things that require special attention in hydroponics are: (1) the occasional addition of water or solution when necessary to maintain the solution level in the

tank; (2) the frequent testing of the solution for acidity and its adjustment by addition of acid; (3) the renewal of the entire charge of solution from time to time. The solution level may fluctuate between 1.5 or 2.0 inches and 2.5 or 3.0 inches below the tank rim. The whole solution should be removed and discarded after about 4, 3 or 2 weeks, according to size of plants and volume of tank, renewals being more frequent as the plants grow larger.

Culture Tanks

Tanks are to be horizontal, about 8--10 inches deep, 2--4 feet wide, of any desired length; they may be of wood, sheet metal or concrete. Whatever material is used, the inside is to be thoroughly covered with asphalt paint or waterproof varnish. Paint must first dry thoroughly in air and then the tank should be kept full of water, with several changes, for a week or more before being used. An inexpensive and satisfactory tank for small cultures is a square galvanized-iron wash-tub (holding about 18 gallons), provided with an emptying outlet close to the bottom and an overflow outlet about 1.5 inches from the top; outlets are conveniently installed by drilling and reaming, each opening being provided with a tightly set 1-hole rubber stopper bearing a few inches of 3/8-inch iron pipe. For the emptying outlet a male hose coupling may be used instead of pipe, to which garden hose may be attached to carry discarded solution away. The overflow opening remains open at all times and the other is closed with a rubber stopper except when solution is to be withdrawn.

Plant Beds

Suitable plant beds, to support the plants above the solution, may be arranged somewhat as follows. A wooden frame built like a shallow box with tightly-stretched 1.5-inch wire netting ("chicken wire") for bottom rests on the tank top, the sides of the box being about 4 inches high and 7/8 inch thick. The bed itself may consist of a layer of wet excelsior (about 1 inch thick, pressed firmly on the netting), topped with a 2-inch layer of garden peat moss mixed with sand (about equal proportions by volume). An opening for adding water or solution and for removing solution samples without disturbing the bed is conveniently provided by means of a "tin can" with both bottom and top removed, which stands on the netting and extends somewhat above the bed surface. Supports for frames or bars to support the plant tops may be bolted to the sides of the bed frame. A suitable wooden prop will be needed from time to time, so that one edge of the bed frame may be raised a foot or more and held thus while the solution in the tank is stirred with a wooden paddle. The bed should never touch the solution below; open-mesh cloth between netting and excelsior may be used to keep strands of excelsior from reaching down to the solution.--Other arrangements may be devised; straw has been employed in place of excelsior, rice hulls have been used instead of peat moss. It is well to avoid the use of ordinary soil unless one is certain that it carries no injurious organisms.

Placing the Plants

Seedlings are best grown as for transplanting to an ordinary garden bed. A generally satisfactory seed bed is a 7-inch flower

pot waterproofed with spar varnish inside and out, nearly filled with clean moist sand (with bit of cloth over hole) into which 1--2 grams of powdered potassium nitrate (KNO_3) has been thoroughly mixed. A level teaspoonful of KNO_3 may be dissolved in a half-pint of tap water and the resulting solution may be thoroughly mixed into the sand. These pots should stand in good light in a shallow tray in which water is kept about 0.5--0.75 inch deep. Pots may be covered with paper or cloth till seedlings emerge. Seedlings, larger plants or bulbs (gladiolus, etc.) are planted in the bed in the ordinary way, being watered from above only till the growing roots reach the solution below. Plants are spaced more closely than in open ground, but not too closely for them to have good light when they become large. Gladiolus corms have given excellent results when placed about 3 inches apart in each direction; three or four tomato plants per 18-gallon washtub should be satisfactory. A good support for a culture of gladiolus is a horizontal wooden frame of 2-inch wire netting, resting at first on the top of the bed but gradually raised as leaves elongate through it, till it is just below the bases of the flower spikes at blooming time; this support is conveniently held in place by means of uprights from the bed frame.--After plants such as tomato are well started, the bed surface may well be covered with asphalt roofing paper cut so as to project laterally somewhat beyond the tank, with openings for filler can and for plants; this retards evaporation and prevents or limits entrance of rain water through the bed into the tank. If too much rain penetrates, diluted solution naturally overflows through outlet pipe.

A Simple Nutrient Solution

A. Mix very thoroughly in an earthenware crock the following salts*:--

Main Salts

Potassium nitrate (KNO_3)	2000 gm.(70.4 oz.)
Calcium nitrate ($Ca(NO_3)_2$)	300 gm.(10.7 oz.)
Mono-calcium phosphate ($Ca(H_2PO_4)_2$)	500 gm.(17.6 oz.)
Magnesium sulphate ($MgSO_4$)	500 gm.(17.6 oz.)

* For such small cultures it is best to use chemicals from a drug store or chemical supply firm; fertilizer grades are just as good, but may be difficult to obtain in small quantities. The druggist will weigh these out accurately enough. Their water contents are to be neglected; weigh the salts as they come; they need not be of highest purity, a cheaper grade being really preferable because impurities may be beneficial to plants.

Salt mixtures for hydroponic cultures are already appearing on the market in this country, under various trade names and at very high prices. Their use avoids some trouble, but one is likely to be uncertain about their chemical content and one must of course pay for packaging, etc., as well as for advertising. No miracles are to be expected from the use of such preparations.

Extra Salts

Ferrous sulphate ($FeSo_4$)	50 gm. (1.8 oz.)
Copper carbonate	2 gm. (0.07 oz.)
Zinc carbonate	2 gm. (0.07 oz.)
Borax	4 gm. (0.14 oz.)
Manganese sulphate	4 gm. (0.14 oz.)

Total weight ..... 3.362 kg.

Portions of this mixture are to be dissolved in tap water to make nutrient solution, which should contain the six main nutrient units in approximately the following percentage proportions: NO_3, 42; K, 37; PO_4, 7.5; Ca, 6; SO_4, 3.7; Mg, 3.7. It also contains traces of the extra (or microtrophic) elements; iron, copper, zinc, boron and manganese.

Many other sets of proportions of these main salts, or of other suitable ones, have been found useful and many different solution formulas have been recommended by experimenters, as has been said. Nitrogen is sometimes partly supplied as ammonium sulphate [$(NH_4)_2SO_4$], being generally used along with nitrate (NO_3). At the rate of 1 gram per liter (which gives a good concentration for many plants), this salt mixture should care for 3362 liters of nutrient solution.

B. To prepare a culture tank of nutrient solution: (1) First fill the horizontal tank with tap water to within about 2 inches of the top, measuring the water required. (2) Weigh out as many grams of the salt mixture as there are liters of water in the tank. (One liter is about 1.08 quarts.) (3) Remove about half of the water from the tank and dissolve the weighed-out salt mixture in the remaining water, stirring with a wooden paddle. (4) Add tap water to refill the tank as before, with more stirring; a water jet from garden hose gives automatic stirring. (5) Adjust acidity of solution by adding sulphuric acid (H_2SO_4, 5-per cent. or 10-per cent. solution) little by little, with thorough stirring, till the acidity value (pH) is 5.0--5.4. (See below.) For use when the solution is to be renewed, keep a record of the amount of H_2SO_4 thus required for each tank of nutrient solution.--It is well to add some clean common nails to each tank at the start, to give better assurance that the supply of iron may not become inadequate, and new nails may be added from time to time.

Acidity Tests

Unless adequate care is exercised, freshly prepared nutrient solution may be either not acid enough or too acid for healthy plant growth. On the pH scale (used for measuring acidity) neutrality is represented by the value 7.0, and acidity increases progressively with decreasing pH values. For most plants and climates such solutions as the one described above should have a pH value not greater than 6.0 and not less than 5.2--5.0. The pH value of a solution is most conveniently estimated by means of a suitable indicator dye whose color changes with the degree of acidity present. It is convenient to use strips of standard paper that have been impregnated with the dye and then dried. (These may be obtained from chemical supply firms--e.g., from La Motte Chemical Products Co., of Baltimore--or one may purchase

standard dye solution and prepare one's own paper therefrom.) For testing the acidity of nutrient solutions, one needs a supply of paper strips (about 0.25 inch x 3 inches) impregnated with the dye chlorphenol red, or a supply of strips impregnated with bromcresol green. Both are good.

The color of a chlorphenol red strip is buff at pH 5.0, slightly orange at pH5.2, distinctly red-orange at pH 5.4, and increasingly red at pH 5.6, 5.8, 6.0. Dip the paper slip in the solution to be tested: if the color reaction is yellow, the solution is too acid; if it is only slightly reddish yellow (orange), the solution acidity is about right; if it is red, the solution requires addition of acid.

A bromcresol green strip is green or slightly bluish green at pH 5.0, bluish green or slightly greenish blue at pH 5.2, definitely blue at pH 5.4, and increasingly blue at pH 5.6, 5.8, 6.0. If strip dipped in solution is yellow or green, solution is too acid; if reaction color is slightly greenish blue, the solution acidity is about right; if it is distinctly blue, the solution requires addition of acid.

Freshly made nutrient solution is likely to require addition of acid (depending on the pH value of the tap water used), and a solution in which plants have been growing for a week or more is almost certain to require acid; plants generally reduce the acidity of the solution. In adjusting solution acidity, add weak solution of H_2SO_4, little by little and with thorough stirring, until color of dipped chlorphenol red strip is buff or only slightly orange (not red); or until dipped bromcresol green strip is somewhat more blue than green (not clearly blue). Disregard the line of brighter color that develops along the margin of the wet region of the strip as that margin advances by capillarity.

In short, color reaction of adjusted solution should be reddish yellow (chlorphenol red) or greenish blue (bromcresol green).

When solution is made up in the tank (at start and at times of solution renewal), the acidity test may be applied in the tank, but tests for intervening adjustments may best be applied to samples taken from the tank. But a test may be made at any time by attaching a slip of test paper to the end of a slender wood stick (or glass rod or tube) and thrusting it down into the solution through the filler opening. Whenever acid has been added, mixing must be very thorough before the following test is applied. If too much acid has been added, the acidity is to be reduced by adding solution of sodium bicarbonate ($NaHCO_3$).

Maintaining the Culture Solution

Nutrient solution is placed in the tank and adjusted for acidity just before the plant bed is installed and the plants are started. Test the depth of solution in the tank (with slender wood stick passed through filler opening) from time to time and add tap water when the level descends about an inch. The original charge of solution should be drawn off and discarded after about a month, and thereafter at intervals of about 3 or 2 weeks. The growing plants remove salts with increasing rapidity, especially

KNO_3, and it is more convenient to renew the solution as a whole than to attempt to add salts to it. If at any time plants appear unhealthy although acidity of solution has not been too low (i.e., if pH value has not been too great), and if the trouble cannot be traced to diseases or insects, then it is advisable to renew the solution. (Discarded solution will not harm plants growing in soil; it may be conducted to lawn or ordinary garden bed.)

After emptying, the tank is refilled just as it was filled at the start, but the amount of H_2SO_4 required may be estimated from the first experience; add somewhat less acid than was needed at the start and then add more, little by little with thorough stirring, till the test paper gives the required color reaction. (if this limit is passed solution may be brought back to required acidity by addition of solution of sodium bicarbonate (baking soda, $NaHCO_3$), with thorough stirring.)

The bed frame is raised at one edge and propped up while renewal is in progress, but one tries to avoid, as far as possible, exposing roots to wind. In stirring solution, avoid mechanical injury to roots.

In the intervals between solution renewals the solution should be tested frequently (weekly or oftener) for acidity, and adjusted when necessary. Acidity adjustment without renewal is accomplished by removing a measured sample (1 liter or 1 quart) of solution-- by means of a rubber-tube siphon through the filler opening or by dipping while the bed frame is temporarily raised --and applying test paper to the sample. If sample is not acid enough, add 1-per cent. solution of H_2SO_4 to it, with stirring, till color reaction is right. This is best done from a burette or with a pipette. Note amount of 1-per cent. acid required, compute amount of acid to be added to solution in tank, lift bed frame and add somewhat less than that amount of H_2SO_4, stirring thoroughly; add more acid, little by little and with thorough stirring, till color reaction is right. For testing a sample (1 liter or 1 quart) use 1-per cent. acid, but stronger acid may be used for the tank, according to requirements. (10 milliliters of 1-per cent. acid carries the same amount of H_2SO_4 as 1 milliliter of 10-per cent. acid, etc.) Sulphuric acid stronger than 10-per cent. should not be used; a solution of that strength may be diluted with tap water to give weaker solution. (1 ml. of 10-per cent. solution and 9 ml. of water give 10 ml. of 1-per cent. solution, etc.) Danger! To make a 5- or 10-per cent. solution of H_2SO_4 from concentrated acid exercise great care; introduce the strong acid little by little into a large volume of water and stir thoroughly meanwhile.

For all these tests it is almost necessary to have a 25-ml. or 50-ml. burette (reading to 0.1 ml.) and a suitable support, also a graduated cylinder (100 ml. or larger). A graduated pipette holding 10 ml. and reading to 1 ml. is very convenient.

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SOME FLOWERS OF APRIL

By C. Haven Kolb, Jr.

March had its flowers, lowly and little noticed -- the fetid skunk cabbage, held close in the embrace of the ice-rimmed swamp; small dandelions, fearing to raise their heads into the chill air; the tiny white blossoms of chickweed and Whitlow grass; and the pendent catkins of the alder and poplar, scarce considered blossoms at all by the careless woodland stroller. But it is only now with the first days of April that the real season of blooming gets under way.

Etched into the ancient rocks the deep gorges of the Patapsco and Gunpowder trace sinuously across the piedmont and debouch upon the coastal plain a short distance south and north of Baltimore. Upon the steep south and westward-facing slopes of these wooded canyons the wild gardens of April are to be found. Here, protected from the cold northeastern winds of early spring and fostered by the warm afternoon sun and long rains, the loved blossoms lift their tender heads from the pre-formed buds in the leaf-mold with startling rapidity.

The ground is springy under foot, the sky is baby-blue above, while round about us shimmers the light green haze of budding trees. Along the floor of the little ravine the green spears of garlic stand in squads among the brown leaves and close by the water the more yellowish green swords of the day-lilies are pushing upward in clumps.

A little farther and we find our first flowers. Strewn carelessly along the path, their weak stalks leaning upon each other or half-recumbent upon the moist ground, the fresh stars of the spring-beauty look up at us from random constellations. Some are white with delicate pink lines traced upon the five petals, others have a pale blush throughout, and a few range from pure white to light rose. They love the moisture and we shall leave them behind as we presently climb the hillside. But before we ascend we are attracted by the striking flower of the dog's-tooth violet or adder's-tongue. A golden bell when half opened, this flower is easily recognized as a true lily when the six yellow petals and sepals are fully recurved, conspicuously revealing the large, dark brown stamens. The wide leaves are nearly as interesting as the flowers. They are dark green, boldly mottled with rich brown.

Now we come to the first slope of the hill and new blossoms are spread out before us. The four palest-pink petals of the toothwort form little crosses in a cluster above the jagged leaves which give the plant its name. Its stalks are sturdy, but beside it, rising to an equal height, are the slim stems of the anemone, the windflower, so called because the slightest air current sets the delicate plant to trembling. Its five-parted flowers are white or faintly pink as they nod continuously on their threadlike stems.

No blush mars the immaculate purity of the bloodroot's many-petaled flower. This gold-filled chalice of swan's down white

gives no hint of the sanguinary dye which stains its inner tissues and betrays its name.

Upward now, among the gray outcrops of rock. The earth is no longer sticky with mud; it is soft and crumbly and smells strongly of warmth and life as we scrape away the musty leaf-mold in search of upland plants. In little bits of soil cupped in the rocks, the tiny flowers of the saxifrage stick their heads up on short hairy stalks, bringing with them the breath of bleak northern tundras, ancestral home of their clan.

Almost a stranger now is this little creeping plant. Love has been the doom of the trailing arbutus in many localities. The chaste pink clusters of flowers against the leathery bronze-green leaves, the ineffable fragrance vaguely suggesting the whole of springtime yearning, these properties have caused it to be ripped ungently from the earth for use as a sign of human gentleness.

And last, here are the trilobed leaves of hepatica. From the center of a clump in the crevice of a rock rise the soft and simple flowers, white, pinkish, and the cleanest, fairest lavender in all the world.

There is a tenderness, an innocence, a virginity, in the pastel shades and delicate textures of these April flowers. Of diverse habits, all share alike the aura of newness. Color will be more vivid later, forms more complex, but never again in the rolling of the year will we have among flowers the simple, child-like charm of April's flora.

April, the month of opening, of the first display -- far back in antiquity Latin herdsmen, watching the flowers spring up along the Tiber gave us that name. And today, we, walking beside less time-hallowed waters, once more may see this awakening.

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NOTES FOR THE MONTH OF MARCH

Meetings and Lectures at the Society

March 1 - Mineral Club.
3 - Bird Club.
7 - Lecture by Rev. John H. Brosnan, S.J., "Volcanoes in General, a Few in Particular with Special Color Reel of Kilauea in Action".
10 - Plant Club.
14 - Talk by . Wilmer Bell, "Chemistry of Rhythmic Bandings."
21 - Talk by Mr. Edward Crosby, "New Methods in Developers and Developing Negatives in Regard to Natural History Subjects".
25 - Annual Meeting and Tenth Anniversary Celebration.
28 - Talk by Mr. Price Piquett, "Bee Keeping".

Junior Division

March 4 - General Assembly Mr. E. B. Fladung, Discussion of Annual Meeting.
11 - Talk by . William Norman, "Turtles of Maryland", Mr. Joseph Bures, "Art in Natural History".

18 - Talk by Miss Helen Klinke, "Water Conservation".
25 - Annual Meeting and Tenth Anniversary Celebration of Society.

Lectures, Exhibitions and School Loans

March 6 - Junior High School No. 1, Lecture by Mr. Elra M. Palmer assisted by Mr. James Leake, "Maryland Snakes".
6 - Troop 13, Boy Scouts of America, Loan of Birds.
8 - Maryland State Teachers' College, Lecture by Mr. Gilbert C. Klingel, "A Naturalist's Quest in Inagua".
8 - Maryland State Teachers' College, Loan of Birds.
8 - Branch 11, Enoch Pratt Library, Exhibit of Birds and Bird Nests.
13 - Patterson Park Junior High School, Lecture by Mr. Oscar Helm, "Shells and Their Structure".

15 - Pimlico School, Loan of Insects.
17 - Hagerstown Girl Scout Troop. Exhibit of Insects.
17 - Elkridge High School. Loan of Birds.
19 - Hagerstown High School. Exhibit of Insects.
20 - Field Stone Garden Club. Lecture by Mr. Irving E. Hampe, "Our Winter Birds".
School No. 215. Loan of Birds.
21 - Public School Exhibit, Loan of Insect Habitat Group. Also gift of Insects.
24 - Maryland State Teachers' College. Loan of Lantern Slides.
25 - Tenth Anniversary Celebration of Society, Sears Community House, Banquet, entertainment and lecture. Lecture by Mr. Benjamin Kurtz of the National Museum, "Indian Tribes of America". Illustrated with motion pictures.

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CLUB NOTICE

As there are many members who would like to pursue the study of one or more nature subjects, the Society has inaugurated a series of Clubs for this purpose.

Mineral Club - First Wednesday of each month.
Bird Club - First Friday of each month.
Plant Club - Second Friday of each month.
Photographic Club - Third Friday of each month.
Herpetology Club - Every Saturday at 7:00 P. M.

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The Natural History Society of Maryland

BULLETIN

Volume IX MAY, 1939 Number 9

GROWING AND TRANSPLANTING SOME NATIVE FLOWERS

By Andrew Simon

(Note: For some years Mr. Simon has been growing and experimenting with nearly one hundred varieties of wild flowers.)

Firepink

Firepink (Silene virginica), is a rather uncommon and much sought for little plant, which grows in loose, gravelly soil or on the open cliffs. The dense tuft of foliage with the bright pink single flower an inch broad grows from the thick surface of the root stalk to a height of four to six inches. It is one of our best wild flowers for sunny rock planting.

The Firepink will propagate freely from cuttings taken in early fall and put in mixtures of peat moss and sand. Moreover it will also grow very well from its own seed dropped in crevices in the rock garden. Its roots are from twelve to twenty-four inches long and grow best in between fissures and disintegrating rocks. Since the roots go so far to feed, the plant should not be mulched, but should be grown in quite poor and gritty soil, and not in clay or deep rich soil. And the plants should never be watered, as this tends to rot the crown. Nature provides the Firepink with sufficient water.

In transplanting only the younger plants should be dug up; the older ones have their roots in too deep. Lift the small young plants out of the ground, free of soil, and as much of the roots as possible (which would be about eight to twelve inches long) and replant them in rock gardens as deep as they were in nature, so that the crown always rests on stone or grit.

Pink Moccasin Flower
(Cypripedium acaule)

The Firepink never "dies back" as most perennials do. Instead, every year it adds to its growth, increasing about one-half inch to an inch. August and September are the best months for transplanting this wild flower.

It should be remembered that the Firepink cannot thrive if planted near other plants or trees; consequently it must be placed in the open away from them.

Pink Moccasin Flower

The Pink Moccasin Flower (Cypripedium acaule) is an inhabitant of our woods and forests, where it grows in the thick leafmold, as well as in the thin poorer soil under Baltimore County conifers. Of singular beauty is its single large pink flower which grows on a stem ten to fifteen inches high. Two dark green basal leaves complete the picture. It is in flower in late May and early June.

This species must live in an acid soil, for the plant cannot thrive in an alkali one. Also while it will grow in drier places than other species of Ladyslippers, in transplanting it must be kept moist until it has a foothold.

In Baltimore County I have found the plant commonly under Oak trees, Pine trees, near Laurel, Rhododendron, Blueberry, Cedar, and Shad bush, and Dogwood. These species are likewise partial to acid soil.

By the end of June, the plants have completed their growth for that year, and they can be safely transplanted in July, August, and September.

It is of interest to note that the roots of the Pink Ladyslipper grow sideways about eight to ten inches from the stalk, and must not be cut, since roots once cut have no power to continue growing; all roots must start from the base.

In transplanting, young plants should be used which can be dug up like sod (from eight to ten inches across and three inches deep) and once transplanted they should never be watered although in very dry season they may be given extra mulch.

Striped Pipsissewa

The Striped Pipsissewa (Chimaphila maculata) is generally found growing in dry pine woods, or near old Chestnut stumps and under Oak trees. It has white flowers, and leaves which are splotched with white along the midrib. Frequently the plant forms colonies of from one stalk to several hundreds, for its root stalks creep along, spreading this way and that. Acid soil is best for this plant. A covering of Pine needles on a heavy mulch of Oak leaf mold is therefore beneficial.

Pipsissewa should be transplanted in late summer or early autumn and should be mulched heavily to keep from heaving as it will freeze if it heaves. When transplanting this species, one should treat it like sod. Use a spade or shovel, and cut out

pieces of soil about twelve inches wide and twelve to fifteen inches long with a depth of two or three inches.

Every fall these plants should receive an extra amount of mulch as they would in nature when the leaves fall. Actually Pipsissewa will grow in a very shallow soil no deeper than a few inches inasmuch as it procures its food from these decaying leaves, roots, and needles that lie near the surface.

The best way to propagate the plant is to allow it to seed, thereby starting small colonies, and these may be dug up as described above.

Birdsfoot Violet

The Birdsfoot Violet (Viola pedata), one of our lovliest native violets, is not quite so common as several of our other species of violets, although it will be found abundantly in some places where there is dry, sandy soil and open woods.

This neat compact plant of beautiful foliage grows about three inches tall and in late April and early May is covered with large blue flowers an inch or more across.

The Birdsfoot violets are the easiest of our finer native flowers to transplant, if supplied with the necessary sun, soil and slope condition. The roots which need a very deep soil not rich but very gritty, sandy and stony, will go down to about eight to twelve inches. These plants will seed freely so that the seedlings may be dug up quite easily.

Near Sweet Fern, Dwarf Blueberry, and Laurel, the Birdsfoot violets grow prolifically, but they cannot withstand the roots of any large trees and must grow in the open and receive abundance of sunlight. Frequently they will be noticed growing on slopes containing quartz gravel, on hillsides consisting of disintegrated feldspar and weathered quartzite.

It is interesting to note that the Birdsfoot violet is an evergreen all winter but it is without leaves all late summer and early fall. Consequently summer and early fall are the best times to transplant this flower in the type of soil referred to above. It is always best to transplant wild flowers in that period when they are not actively growing.

This plant is another that should never be watered after it is established as nature takes care of it very well.

THE MYSTERY OF BIRD MIGRATION

By Gorman J. Bond

With the coming of spring and the presence of many birds which have been absent throughout the winter, it is quite natural that we should give some thought to the great mystery of bird migration.

For more than two thousand years, this great phenomon of nature has interested if not bewildered all those who have witnessed it. Then too, there was much speculation as to just where the birds spent the winter months. There were those who thought that they hibernated in the mud, while others contended that they flew to the moon whence they found food and warmth during the long, cold season on earth. In later periods, scientists and observing nature lovers noted that these birds had a specific destination when they left for their long trip south. By careful observations, notes, and more recently bird-bands, the winter habitats of these birds have been learned.

Why do birds migrate? At least two theories have been advanced to show the origin of migration. According to the first theory, the United States and Canada, before the Ice Age, were located in a lush and semi-tropical climate; therefore migration was not necessary, but as the glacial era approached, the cold weather produced a slack in the food supply. This caused the birds to go farther south to obtain their food, or starve for lack of nourishment. As this transition was very slow, the ice approaching and then retreating gradually, the continual advancing and retreating of the birds caused them to develop a kind of habit which was adopted as an instinct in the succeeding generations. At the height of the Ice Age the birds were confined almost wholly to Central and South America; but the instinct of migration has been so inculcated in the birds over a period of years, that when the ice finally retreated to its present position, the birds continued to go north at the retreat of cold weather and south as the icy winds of winter approached.

In this theory, you see that the bird's strongest instinct is the love of home and the impulse to get to the place of its birth as soon as possible; some birds being so compelled to come north that they face icy winds and starvation rather than return to the South. Those who oppose this theory say that if the love of home is the reason for migration, why do some birds leave their homes for the south as soon as nesting is over, some even leaving so early that their young are forced to shift for themselves.

According to the other theory, the south has always been the real home of the birds, but as over production causes over-population, the birds set out for breeding grounds further north as the retreating ice left vast areas of uninhabited land. But as the south was still their home, they left their breeding grounds as soon as nesting was completed. This explains, as the proponents of this theory claim, why so many birds leave for the south as soon as their breeding and nesting duties are over.

Whichever theory is accepted, we must realize that it is a physiological force from within more than anything else which prompts these birds to start their great exodus northward when Spring begins; because in the sultry jungles of the Amazon, there are no temperature changes to tell that Spring is beginning in the north.

Why some birds migrate by day and others by night may be easily explained if we note the birds which use these different mediums. The great families of birds which include the Orioles, Flycatchers, Thrushes, Tanagers, Warblers, etc., are night migrants.

The night migrants include to a great extent all those small birds to which darkness offers a protective cloak from the predatory hawks which are so prevalent during migration. On the other hand the day migrants may include the Nighthawks and Swifts, but these fast flyers have little trouble eluding their predatory cousins. It appears then that protection is the main factor in migration, to small birds. Such birds as Ducks, Geese, and Hawks to which food supply rather than protection is the main factor, migrate by day.

The speed of birds in migration is very slow, averaging roughly 25 miles per day. There is, of course, a great variation in this rate according to the species. Those species migrating at night average greater distances than those migrating by day.

Migration causes many unusual occurrences in the bird population of a certain area. Many species are seen at migration time which are seen at no other time of the year. As an illustration, note the Robin which is found throughout the year in the middle section of the United States, but in Florida only in the winter, and in Canada only in the summer.

An account of migration would not be complete without mentioning that champion of migrants, the Arctic Tern, which flies 11,000 miles from its home in the Arctic to its winter home in the Antarctic, and back again in Spring. This trip takes about ten weeks in each direction. Another unusual migrant is the Golden Plover, which launches out over the Atlantic at Nova Scotia, and flies over the open ocean to the West Indies, across the Gulf of Mexico and into South America where it comes to rest on the pampas of Argentina.

Over a period of years a great amount of information has been collected as to the migration of birds, their routes, destinations, winter habitats, impulses, and other useful and interesting miscellania. However, much is to be learned even about the most common species. For instance, the winter home of the Chimney Swift has remained a mystery to science for many years, and it has only been recently that the breeding grounds of the Blue Goose have been noted, a nest being finally found on the southwestern end of Baffin Island. With the spread of bird-banding by the government and by individuals, it is to be hoped that more genuinely useful information can be obtained which may clear up some of the mysteries of migration that have been existing for years.

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KNOW YOUR MUSEUM

Butterflies

On almost any Sunday or Saturday, when one goes to the Museum, can be seen boys and girls standing before the exhibit on Maryland butterflies and moths.

The collecting of butterflies seems to have been the beginning of interest in nature study for many of our naturalists. It was

so with the writer and most of our members who are now engaged in other branches of Natural History.

One can easily see why this is so. Butterflies are attractive. Their coloring and airiness fascinates the young and the possession of a number of these specimens is truly a delight and never ending source of pleasure.

Maryland is fortunate in that there are so many species and such beautiful ones. There are approximately 125 species -- from the lordly Tiger Swallowtail measuring approximately five inches across the wings to the tiny Tailed Blue with a wing expanse of about 3/4 inches. Between these two extremes we have every size and many colors. Butterflies are on the wing sometime in April and even earlier if we chance to have a warm day. On such a day the Mourning Cloak, one of the few butterflies to over-winter in the adult stage, leaves its hibernation. Often a premature Cabbage Butterfly or Checkered-white is seen flying about in the warm sunlight. In May more species may be seen and by the middle of June and July the height of the season is on. This continues to late October when suddenly they all seem to have disappeared. Sometimes in the very early fall one can witness the migration of the Monarch. Thousands of these airy creatures can be seen flying to where no one knows, because they never return.

Much can be written about this most interesting insect, for each species has a life history which is of interest, but space does not permit.

A collection such as we have in the Museum consists of those butterflies commonly seen. They must be replaced at intervals as the strong light from the sun causes them to lose their color. Nevertheless a Museum without such a collection would be incomplete.

E. B. F.

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NOTES FOR THE MONTH OF APRIL

Meetings and Lectures at the Society

April 4 - Talk by Mr. Joseph White, "A Visit to Mt. Katahdin".
5 - Mineral Club.
11 - Talk by Mr. Clyde Reed, "Lichens".
14 - Bird Club.
18 - Talk by Mr. Allen Bonwill, "Bird Houses - A Lesson in Conservation".
21 - Photographic Club.
25 - Talk by Mr. Andrew Simon, "Our Native Perennials".
28 - Plant Club.
15 - Annual Meeting of Board of Trustees. The following officers were elected: President, Edmund B. Fladung; Vice-President, Gilbert C. Klingel; Secretary, John B. Calder; Treasurer, A. Llewellyn Jones. Trustees for Class 1939 were reelected to Class 1942: Dr. Howard A. Kelly, Howard W. Jackson, and John B. Calder

Junior Division

April 1 - Talk by John Norman, "Spring Peepers".

April 1 - Talk by Norman Black, "The Cicada Killer."
1 - Herpetological Club.
8 - Talk by Ralph Powell, "Semi-Precious Stones".
8 - Herpetological Club.
15 - Talk by Elias Cohen, "Catching Poisonous Snakes".
15 - Herpetological Club.
22 - Talk by Wilmer Davison, "Fish".
22 - Herpetological Club.
29 - Parents night. Lecture by Mr. Howard B. Owens and Mr. Allen Bonwill, "Muskeg - Two Expeditions into the North of Canada".

Lectures, Exhibitions and School Loans.

April 1 - Baltimore City College, Loan of Shells.
3 - Baltimore City College, Loan of Fluorite Minerals and Arsenic Ore.
11 - School 99, Loan of Habitat Group.
13 - Baltimore City College, Loan of Fossil Shells.
22 - School 99, Loan of Birds.
22 - Biological Teachers Convention at Eastern High School. Exhibit of Habitat Groups, Birds and Minerals.
Miss Helen Besley was elected to the Council and also Secretary. Miss Besley and Mr. John B. Calder represented the Society on the Council.
Next year's convention will be at St. John's College, Annapolis, Maryland.
24 - Eastern High School, Loan of three Habitat Groups.

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CLUB NOTICE

As there are many members who would like to pursue the study of one or more nature subjects, the Society has inaugurated a series of Clubs for this purpose.

Mineral Club - First Wednesday of each month.
Bird Club - First Friday of each month.
Plant Club - Second Friday of each month.
Photographic Club - Third Friday of each month.
Herpetology Club - Every Saturday at 7:00 P. M.

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The Natural History *Society of Maryland*

BULLETIN

Volume IX JUNE, 1939 Number 10

VARIATIONS IN CERTAIN SPECIES OF CLUPEIDAE POSSESSING A WIDE ENVIRONMENTAL DISTRIBUTION

By David H. Wallace
Assistant Fishery Biologist
Chesapeake Biological Laboratory
Solomons Island, Maryland

Variations due to environment have been observed in widely diversified animal groups. Among the several papers dealing with variations in molluscs, mention may be made of the contribution by Adams (1915) who found conspicuous downstream increase, with respect to weight and spinocity, in the shells of the genus Io. Rensch (1930) brought the European literature up to date, and in 1936, Newcombe and Kessler (1936) who studied weight variation in the soft-shelled clam, May arenaria, on the Atlantic Coast (Bay of Fundy to Chesapeake Bay) found that shell weights were lighter in the more southern latitudes. Additional invertebrate studies in this field include the contributions of Woltereck (1932), on certain Cladocera, and Tower (1918), on the beetle Leptinotarsa.

Fishes show variations in certain meristic characters such as fin rays, vertebrae, gill rakers, and ventral scutes as well as in body proportions. Present knowledge does not warrant attributing all these variations to environmental factors alone, or, with rare exception, to any single variant. In reviewing certain aspects of the subject (Vladykov, 1934) concluded that only three factors are of major importance, namely, temperature, space and salinity. These do not always work in the same directions, and thus the results are sometimes obscured. Schmidt (1917-1930) probably has done the best and most striking investigations on fishes.

Much of Schmidt's work was done on Zoarces, in which an attempt was made to correlate meristic variations with hydrographical changes. In 1930, his results on the North Atlantic cod correlated strikingly with temperature, and led him to attach major significance to this factor. Hubbs (1934), mentions the possible importance of siltiness of water as a modifying factor.

Our results, based upon the examination of over seven hundred Shad (Alosa sapidissima), from along the Atlantic Coast, definitely show the existence of local fish populations. The variations follow the general rule that in a north-south direction the number of vertebrae and fin rays are higher in the north, decreasing - toward the south. Additional meristic studies have shown that more than one striped bass (Roccus saxatilis) population exists within the confines of the Chesapeake Bay. In twenty-five hundred specimens of bass, the number of vertebrae was found to be constant at twenty-five. However, in the northern part of the bay, the fish have a higher number of rays in the dorsal and anal fins than those in the southern part (James River).

The findings on these two species seemed to indicate that variations could take place in anadronomous species along the Atlantic Coast as well as within the Chesapeake Bay river systems. A small number of specimens of herring (Pomolobus pseudoharengus and P. aestivalis) from New York, Chesapeake Bay and North Carolina also were examined for variations in numbers of vertebrae, and ventral scutes as well as in body proportions. Chesapeake Bay samples were collected from two river systems, namely, the Susquehanna and the Choptank. The fish from the former area were hatched, in all probability, under conditions of temperature higher than those from the Choptank area. Since spawning took place in fresh water, salinity does not play an important part. The waters from the Susquehanna River, flow swiftly and contain small amounts of silt and suspended matter in comparison with the Choptank, which drains large areas of flat, sub-marginal land and acquires large amounts of suspended matter. All specimens examined were of a comparable size, ranging from 40-90 mm in length, measured from the tip of the snout to the end of scales on the caudal fin. The specimens were stained in toto in a seventy per cent alcohol solution saturated with alizerine and the vertebrae and ventral scutes counted with the aid of a low power binocular microscope. All body proportion measurements were made in the standard manner.

The results from the data accrued bear out the findings on Shad and Striped bass. The herrings of New York exhibit a higher average number of vertebrae and ventral scutes than those of either Chesapeake Bay or North Carolina fish while the depth of the body was greater in the more southerly sample than in the two more northerly ones. Less consistent variations occur in the head length and eye diameter bearing out observations made by other workers (Vladykov, 1934). Even within the Chesapeake Bay this variation seems to hold true for two of the larger river systems examined. Specimens from the Susquehanna Region possess a higher average number of vertebrae and ventral scutes than the Choptank River section while in the latter area the fishes have slightly deeper bodies. This strongly suggests characteristic schools in the various river systems, and it would seem that the two somewhat markedly different environments would be at least partially responsible. The factors stated above which probably contribute most toward variation in these fishes are temperature and the suspended matter in the water. The establishment of these apparent trends toward speciation, seemingly so active in the Chesapeake Bay, must await further study before final conclusions may be drawn.

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A PRELIMINARY REPORT ON THE REPTILES AND AMPHIBIANS OF CATOCTIN NATIONAL PARK, MARYLAND

By H. Charles Robertson

This great National Park is situated in Frederick County in the Blue Ridge Mountains about seventy-five miles from Baltimore. It is more popularly known as the Catoctin Recreational Center, and is but a few miles from Thurmont. During the early spring of 1938 I decided to make a survey of the reptiles and amphibians of this section, and to give special attention to the life histories and habits of the more common species.

Upon entering the Park, when coming from Thurmont, the road for some distance runs along the foot of a mountain and is quite rocky. Winding alongside the road flows Hunting Creek, a crystal clear mountain stream, which during the trout season lures many fishermen.

When I started my survey the Park had not yet been opened to the public. The picnic and parking areas were still being cleared and these made ideal places to make observations after the workmen had left. Their clearing and leveling off of the large patches of woodland left hardly an unturned stone, so that a number of reptiles and amphibians which ordinarily would hardly have been seen were making their way into the dense surrounding forest. Many snakes, especially the Mountain Blacksnake (Elaphe obsoleta obsoleta) were destroyed by the workmen. Had the men been better informed about the economic value of certain snakes, this useless slaughter would hardly have been committed. However it is true that the Timber Rattlesnake (Crotalus horridus) and the Copperhead Snake (Agkistrodon mokasen) are fairly abundant throughout the Park, and constitute a hazard for men doing such work there.

On my first trip to the picnic area I found that much grading had been done that day leaving the clearing with a blanket of soft fresh earth. Turtles and salamanders were still crawling about in a confused manner, apparently looking for shelter. The remains of a number of Mountain Blacksnakes were found scattered about, the reptiles having been caught in the machinery used to level off the ground.

Listed hereunder are most of the amphibians and reptiles collected or observed during the season of 1938.

Red Eft. (Triturus viridescens viridescens) - Fig. 1

Two specimens of the terrestrial phase of this species were collected. Both were found in a heavily wooded area where the sunlight rarely, if ever, reached the ground. The ground was damp and the rocks on the forest floor were heavily carpeted with moss.

These specimens were slightly under three inches in length when measured. The coloration above was bright red with two rows of dorso-lateral dark red spots outlined with black; the underside was lighter, almost orange and was stippled with black. The eyes were golden yellow, and the pupils were jet black. No costal grooves were present as on other salamanders.

FIG. 2 SLIMY SALAMANDER
Plethodon glutinosus
(natural size)

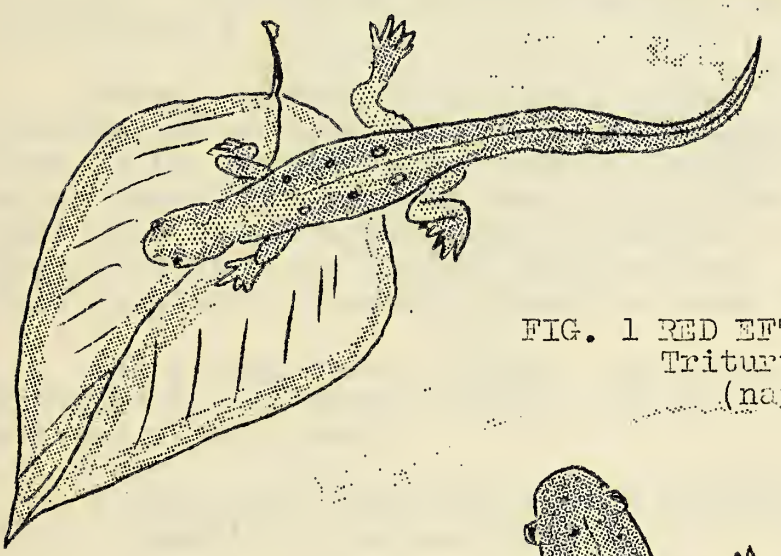
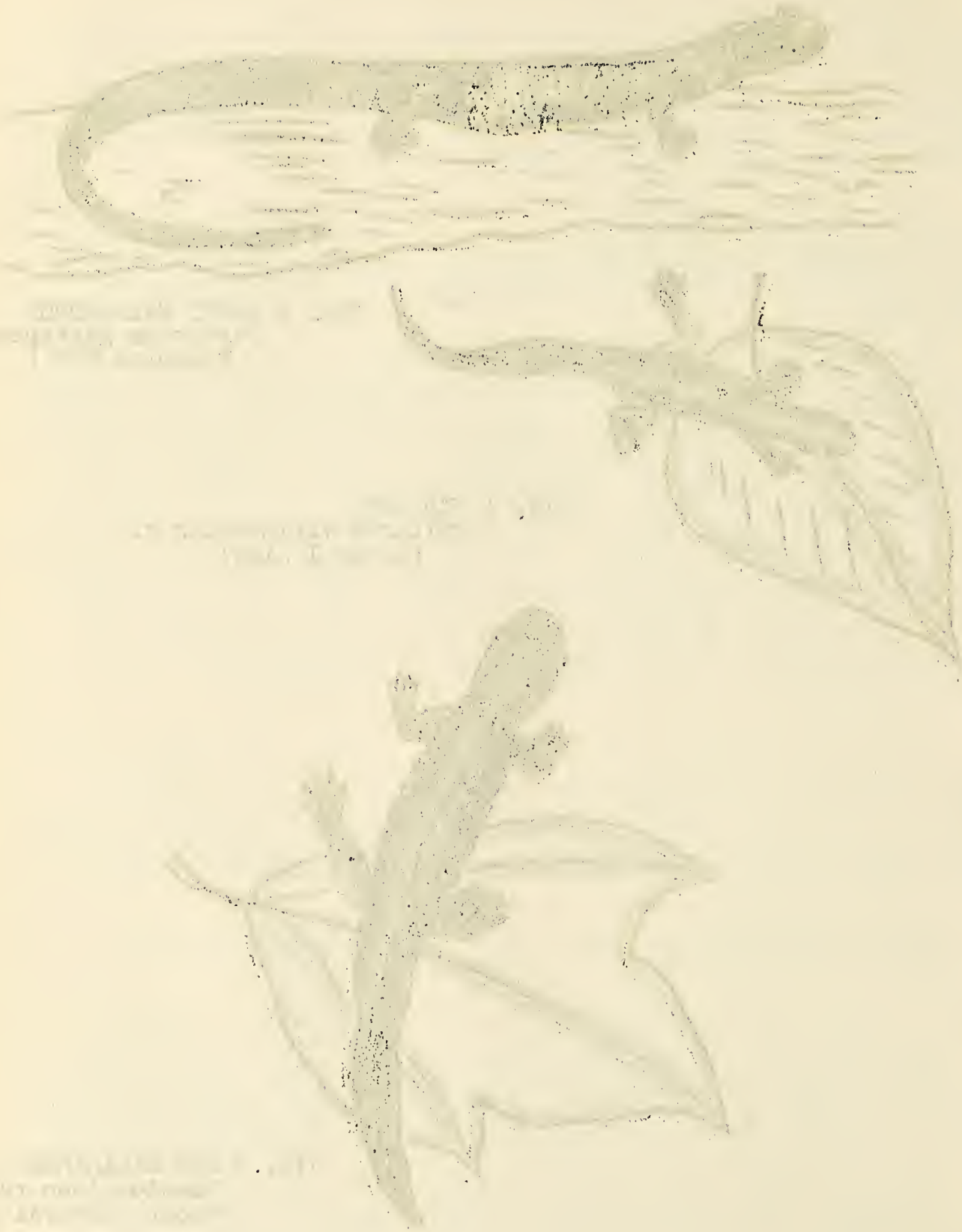


FIG. 1 RED EFT
Triturus viridescens v.
(natural size)

FIG. 3 RED SALAMANDER
Pseudotriton ruber
ruber (natural size



Red-backed Salamander - (Plethodon cinereus)

Only one specimen, which was found under a flat stone, was recorded. The altitude was about 2,000 feet. A slender species, and the neck much narrower than the head. The ground color was brownish black, and the sides were specked with white. A wide brick red dorsal stripe was present. Costal grooves numbered nineteen.

Slimy Salamander - (Plethodon glutinosus) - Fig. 2

A number of these salamanders were found in the trunk of an old decayed tree. When the tree trunk was broken open at least a dozen specimens went scurrying about. Expecting a sight such as this, I was ready to catch as many as possible, which was finally one !

These salamanders are very quick of movement and almost immediately disappear into the soft wood pulp. An abundance of food in the form of grubs was in the old trunk and time and again when the wood pulp was turned over I usually found a specimen. The sizes ranged from two inches to six inches in length, depending upon the age of the creatures. Taken elsewhere in the Park, a slimy salamander measured seven inches, over-all length.

The ground color of this salamander is jet black, and is speckled on the dorso-lateral area with small irregularly shaped silvery white spots.

A few slimy salamanders were observed on trails at night, which suggests nocturnal habits.

The Red Salamander (Pseudotriton ruber ruber) - Fig. 3

One adult specimen was found under a stone. Elevation about 1,900 feet. Length of this specimen five inches.

The body was bright red with small black spots scattered over the dorsal area. The underside was lighter, almost pink.

Also recorded were several specimens of the very common Dusky Salamander (Desmognathus fuscus fuscus), and three Long-Tailed Salamanders (Eurycea longicauda).

The toads and frogs collected will merely be listed, inasmuch as a detailed article concerning them will be published on a later date.

The American Toad	(Bufo americanus) (Holbrook)
Fowler's Toad	(Bufo fowleri) (Garman)
Green Frog	(Rana clamitans) (Latreille)
Leopard Frog	(Rana pipiens) (Schreber)
Pickerel Frog	(Rana palustris) (LeConte)
Wood Frog	(Rana sylvatica) (LeConte)

The amphibians listed above were fairly abundant, and found everywhere in the park.

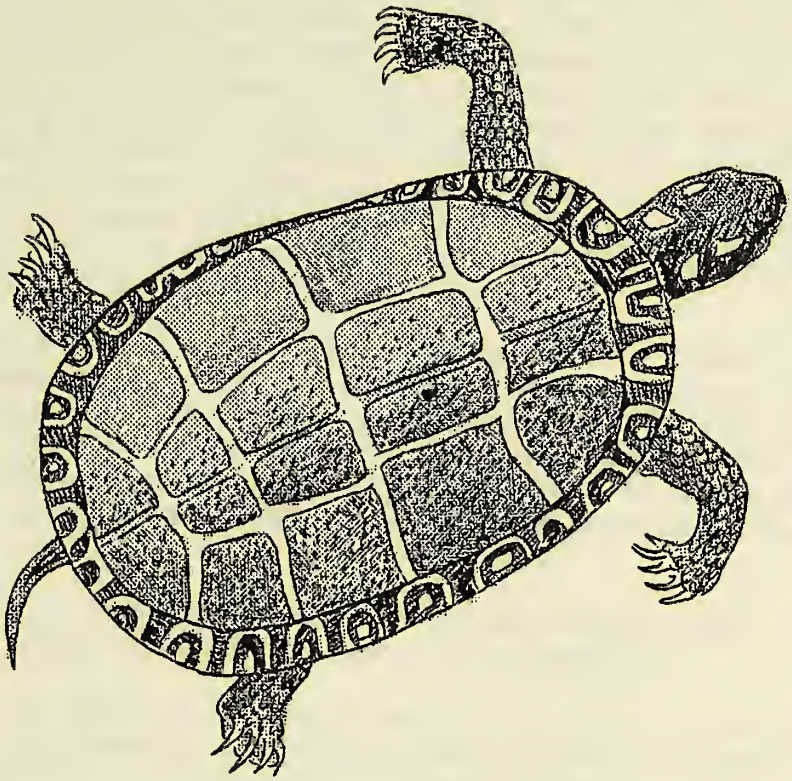


FIG. 4 EASTERN PAINTED TURTLE
Chrysemys picta (natural size)

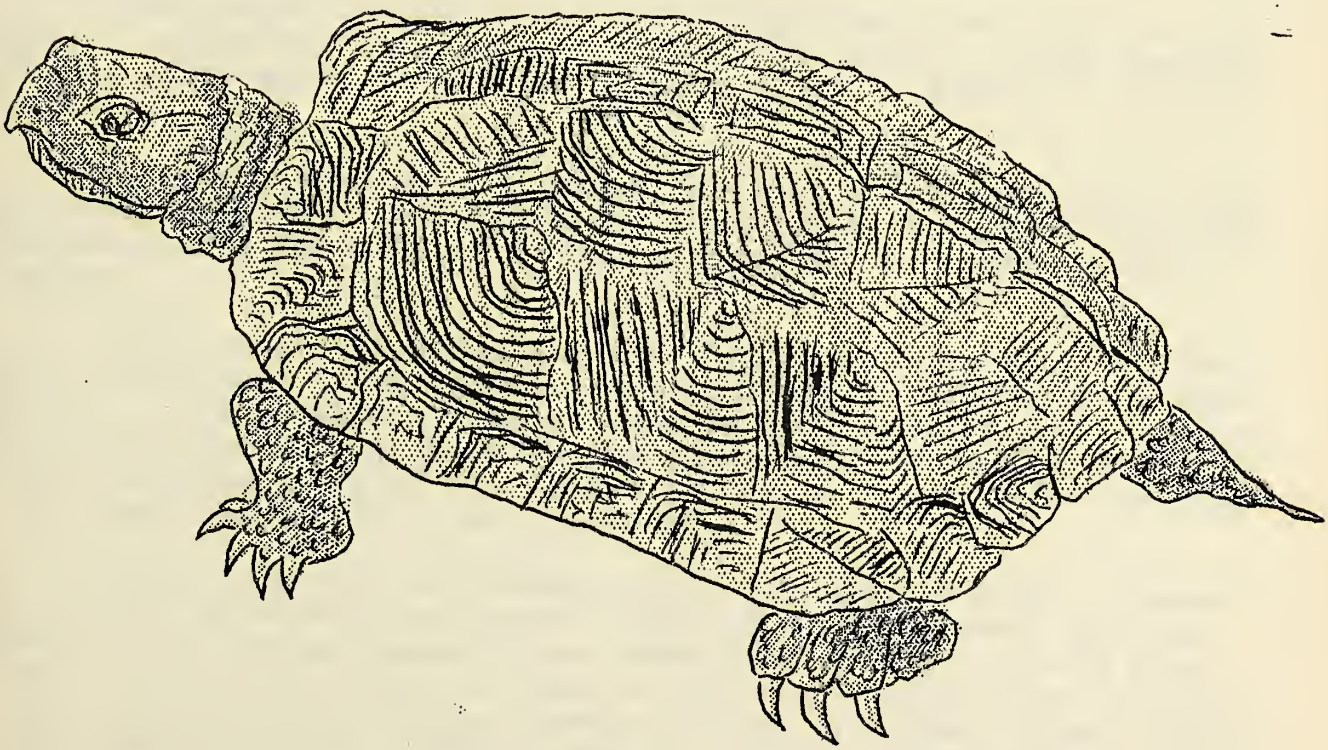
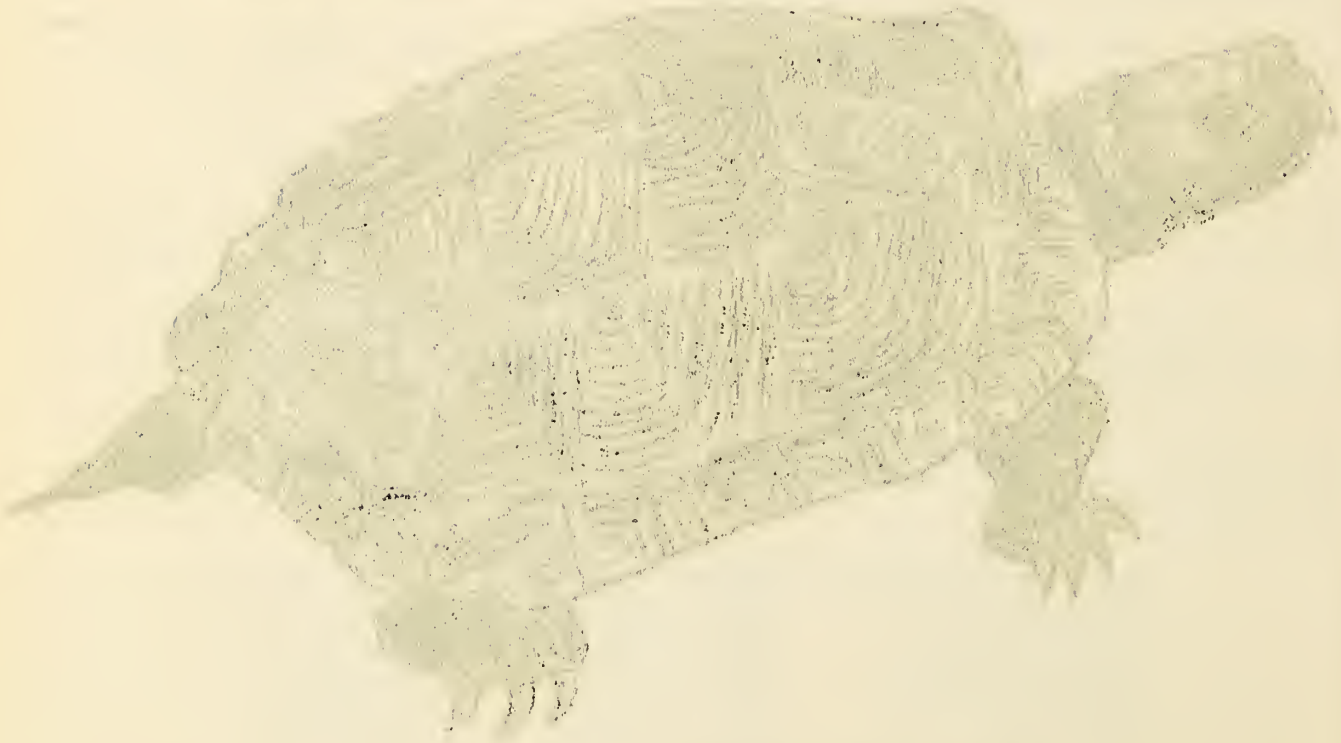


FIG. 5 WOOD TURTLE
Clemmys insculpta (X 1/3)



The Painted Turtle (Chrysemys picta) - Fig. 4

One of the most beautifully marked turtles in Maryland was found to be abundant in ponds and streams in the Park. Actually their distribution is State wide. The carapace of this species is smooth and the edges are rounded. On old specimens the carapace is dark brown or black. The large shields are bordered with yellowish green, and the outer or marginal shields are marked with crescent-shaped blotches of brilliant red. The plastron is wide, and uniform orange in color. Close examination of very old specimens will disclose that the red markings on the outer shields have faded and are indistinct. Young specimens are much more vivid in coloration.

The adults reach a length of six inches. These turtles feed only while submerged, taking hold of and swallowing most of the aquatic insects and also feeding upon small fishes, tadpoles and some aquatic plants. All food is devoured while the turtle is under water; tadpoles and the like are torn to bits by the sharp claws of the fore feet. Out of water the turtle cannot swallow its food.

The painted turtle deposits whitish eggs about 3/4 of an inch in length by about 7/16 of an inch in diameter.

Not all of their time is spent in the water,for they may be found wandering about a long way from a pond or stream. They make attractive specimens in the aquarium.

The Wood or Sculptured Turtle (Clemmys insculpta) Fig. 5

This turtle is one of the first reptiles I observed in the Park. Rarely was it found in or near the water. In the heavily wooded areas where the ground is damp one will likely find Wood Turtles.

One adult specimen collected measured eight inches in length which is large for this species. The average length of the Wood Turtles found throughout this area seems to be nearer to five inches.

The carapace is brown and the plates are roughly sculptured with concentric lines. Hence another popular name, the Sculptured Turtle. The plastron is smooth and is yellowish orange. A large blotch of black is present on the outer edge of each plate. The head and upper side of the limbs are black. Underneath the legs and other fleshy parts are brick red.

Plants comprise the chief food of the Wood Turtle. Leaves of plants, grasses, and berries seem to be preferred. Snails, young frogs and salamanders are sometimes eaten. I found that when in captivity they are fond of raw beef, which they savagely tear into shreds with their powerful legs and sharp claws. Soon after capture these turtles seem to quickly become adjusted to their new surroundings, and will take food from one's hand.

Seven to ten eggs are deposited during the latter part of June and as late as the middle of July. They are deposited singly,

and the average size is about 32 mm. long and about 21 mm. wide; several were 35 mm. long and 23 mm.wide. During the early part of the incubation period the outward appearance of the egg changes but little. The rate of growth of the eggs I checked, seemed to be very slow at first, compared with eggs of equal size from other species. Many nests of eggs were found containing eggs which I believe were Wood Turtle eggs. All of the nests were shallow, being about three inches deep, and had been crudely scooped out by the females. In some cases the loose earth barely covered the eggs. Most nests were found in clearings and were on the south and southwest slopes of the mountains. Other than in this Park the only place I have found the Wood Turtle in Maryland is farther west in the Allegheny Mountains, near Oakland and Swanton in Garrett County. A young specimen said to be collected in Washington County was given to me about four years ago.

The Wood Turtle seems to be able to withstand much cold. One morning in November following a night when there had been a heavy frost, I observed a specimen crawling slowly through the woods. Apparently hibernation takes place in the mud along the banks of streams; two specimens were dug from the bank along Big Hunting Creek.

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KNOW YOUR MUSEUM

In our Museum is an excellent display of Indian pottery. This consists mostly of fragments or portions of pots, and parts of a rim and bottom of a bowl. Sometimes a whole side has been saved. Only one complete pot is exhibited in the Museum and this is from South Carolina. We have collected none nearly so complete in Maryland, and are using this example to illustrate an entire pot.

Why is it so difficult to show unbroken Indian pottery? On visiting our Archaeological laboratory one will see heaps upon heaps of fragments of pottery from various localities throughout the state. Here the job of assembling is under way. Here is a veritable jigsaw puzzle. These fragments are fitted and cemented together. This is an almost endless job, for the pieces are all shapes with all sorts of designs. Many times the worker spends hours without being able to fit two pieces together. How many vessels these pieces represent is hard to tell, but they must certainly represent many. Seldom is a whole pot found.

In the collection of the Society is one small pot from Maryland nearly complete and another much larger pot with a large portion missing. Even the large pot on display from South Carolina has parts missing, which are filled in with plaster, as can be seen.

This is due to many reasons. One is that pots are fragile and easily broken; another is that many of the Indian Village sites are upon farms, and the plows have broken up the larger pieces. Also our Maryland Indians moved from place to place, seldom remaining in one locality for any length of time, and all broken and unusable utensils were left behind. The pots were not glazed

and since many were not well fired, they were easily broken.

Last but not least, civilization gradually encroached upon the village sites, and the contents were disturbed and distributed before the archaeologists could get to them.

Anyone interested in Indian pottery can obtain a good idea of its use in Maryland by studying the exhibit in the Maryland House.

E. B. F.

NOTES FOR THE MONTH OF MAY

Meetings and Lectures at the Society

May 2 - Lecture by Dr. Mark Secrist, "Are the Continents Drifting"?
3 - Mineral Club Meeting.
5 - Bird Club Meeting.
6 - Herpetology Club Meeting.
9 - Talk by Mr. Elra M. Palmer, "Conservation from One Point of Education".
12 - Plant Club Meeting.
16 - Talk by Mr. Frank Yingling, "Fly Casting".
19 - Photography Club Meeting.
20 - Herpetology Club Meeting.
23 - Talk by Mr. Richard Stearns, "Photo Engraving".

Junior Division

May 6 - Talk by Mr. Carl Oertel, "My Experiences in the British Isles"
13 - Talk by Mr. Erwin Raabe, "The Trapdoor Spider in Maryland".
20 - Talk by Miss Edna Jurgens, "Science Exhibits at the New York World's Fair." Talk by Mr. Carl Oertel, "Rock Hall, Md."
27 - Talk by Mr. Clyde Reed, "Wasps".

Lectures, Exhibitions and School Loans

May 1 - Equitable Trust Company - Loan of Mammals.
2 - Hagerstown High School - Loan of Preserved Snakes.
3 - Baltimore City College - Loan of Minerals and Tree Specimens.
4 - Biology Club, Eastern High School, Talk by Miss Janet Byrns, "Maryland Reptiles".
10 - Pimlico School #223 - Loan of Dragonflies.
10 - Baltimore Evening High School, Lecture by Mr. E. M. Palmer, "Maryland Insects".
11 - Baltimore Evening High School, Lecture by Mr. E. M. Palmer, "Maryland Insects".
11 - Baltimore Evening High School, Lecture by Mr. E. M. Palmer, "Colonial Forms of Insects".
11 - Baltimore Evening High School, Lecture by Mr. E. M. Palmer, "Colonial Forms of Insects".
13 - School #51 - Loan of Birds.
16 - Baltimore City College P. T. A. - Loan of three Habitat Groups, four Insects Exhibits, Photographs, Fossils.
17 - Baltimore Evening High School - Loan of three Habitat Groups, four Insects Exhibits, Photographs, Fossils.
18 - Baltimore Evening High School - Loan of three Habitat Groups, four Insects Exhibits, Photographs, Fossils.
22 - Biological Teachers' Convention - Loan of Sixteen Cases of Insects, Birds, Zoo Circulars distributed.

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The Natural History *Society of Maryland*

BULLETIN

VOLUME IX JULY, 1939 Number 11

BOTANICAL PHOTOGRAPHY

By EDWARD L. CROSBY, JR.

This set of notes, while essentially dealing with photographs of plants can obviously be applied, in principle, to other natural history photography. By reason of the relative difficulty experienced by the average photographer in obtaining more than passable natural color results, this material will place emphasis on "black and white prints" as the goal of the botanical photographer. Plant photographs taken in the studio or other unnatural surroundings are generally considered useless from a natural history standpoint.

The experts in the field of botanical photography generally agree that there are three classifications into which all plant pictures can be easily divided. Briefly these groups are: (1) landscapes, or portions thereof, in which the photographer wishes to convey the general appearance of a site or location in which further studies or photographs were made; (2) a plant, or small group of plants, shown as they grow in their natural environment, and, by means of sharp definition in the back and foreground, to show what plants constitute the neighborhood of the plant being photographed; and (3) a plant or plants or portions of such, e.g. flowers or leaves, in which the photograph clearly indicates the precise appearance of the plant itself without showing the background sharply - thereby putting emphasis on the subject of the picture and at the same time producing simplicity and artistic composition.

The preceding sentence brings up another point. Plant photographs serve two very different purposes, namely that of pictorial works, or that of scientific records. It can be readily seen that while the two purposes are quite opposed to each other, a compromise is easily possible. There is no reason why a pictorial print cannot be scientifically useful, nor why a photo, made for study purposes should not possess what is generally called "Print quality".

A minority of plant photographers hold that the best photograph of a particular plant is one which falls into the third of the above groups. That is to say, the best photograph of a violet, for instance, is one which clearly shows the flower, leaves, stem, and immediate foreground of the plant, but which omits or obliterates the tangles mass of grasses, earth, fallen tree-leaves, and other distracting details. Another and somewhat larger group of workers prefer these details, declaring that they comprise a set of data without which the photographs would be incomplete. It is generally agreed by both sides, however, that the two extreme views should be somewhat compromised; and it is interesting to note two things: first, that the maze of background details more often than not tends to destroy the beauty or pictorial appeal of the print, and second, that the conditions under which the picture is taken will often dictate to the photographer that he must be satisfied with the photo as best he can take it.

We must now concern ourselves with the apparatus and materials involved in plant photography and the primary necessity, besides a plant, is a camera. We feel that our tastes in cameras, while apparently following a modern, scientific trend, have been openly frowned-upon by the more experienced workers. So, in order to avoid any biased or editorial material in this paper, we will state not what cameras could be used, but what cameras have been used in photographing botanical subjects. It is possible, (and the feat has been accomplished) to get a fine plant photograph with a fixed-focus or box-type camera. Such a photograph must, of necessity, have been made under nearly ideal circumstances. For those who intend to take plant photography seriously, a more versatile instrument is strongly recommended. Indeed, modern cameras have made every previously existing branch of photography infinitely more satisfactory and have made possible the taking of photographs under conditions which have been hitherto considered impossible.

The camera preferred by plant photographers is one which has the inherent ability to focus "close-up", whether by bellows extension or by extra objectives, and one which has a ground glass screen. The size of the camera seems to be quite immaterial since there are famous plant photographers to be found using the extreme sizes. Dr. Walter Effenberger prefers a 5 x 7 view camera, while Dr. Rudolph Ochs uses a 35 mm. Leica. The 5 x 7 view camera, if fitted with a "sharp-cutting" anastigmat lens, has the advantage that only part of the negative need be used. The 35 mm. camera, on the other hand, due to its short focal-length lens, permits exposures under far worse lighting conditions (and faster exposures under the same conditions) as its big brother, because it possesses, by comparison, far greater depth of focus and therefore can be used effectively at much wider apertures.

The general concensus of opinion in regard to "what camera", especially for the photographer who does not do plant photography exclusively, is this: The 5 x 7 is too large and too expensive to operate (films costing about ten cents each) and the initial cost of the 35 mm. is too great for the worker who does not make his living by its use. (good 35 mm. cameras can cost $200 or more). A compromise is inevitable, and the sizes in widest use range between 2 1/4" x 3 1/4" and 4" x 5". It can be stated that cameras restricted to the use of roll film, because of their inherent limi-

tations, are not the best cameras for plant photographs.

Having dealt with cameras (we hope, sufficiently), let us investigate the film situation. Before we do, however, it is assumed that some method of arriving at correct exposure values is available to the photographer. There are, here again, several basic facts to be considered. Films, are, very broadly speaking, of two types. The first is the fast film with the rather long halftone scale and generally weak contrast. The second is the slow film, possessed of fairly short scale and great contrast or brilliance. With the same amount of effort an inexpert photographer can make a far better final print if he uses a film in the latter group. This statement is one of the utmost importance and if the pictures that you have been producing fail to satisfy you, change your film. This does not mean, of course, that you must "change your brand". It is often very easy to reduce contrast while making a print, but it is never a simple task to coax brilliance from a negative which has none! Since plants are colored objects it is absolutely necessary to use a film which is sensative to all colors- a panchromatic film.

We now arrive at a problem which is hard for most amateur photographers to understand, but which is capable of very easy solution if we remember two rules. The problem is that of rendering colored objects in the desired lightness or darkness on the finished print. The rules are:

1. A light tone on a print indicates that the film responded to or recorded the color of that object, while a dark tone indicates that the color of the original was dark, or the film did not "see" the color strong enough to record it as a light tone.

   Example: A red poppy is photographed with a film which is very sensitive to red. The finished print would represent the poppy as a light gray. The same poppy, if photographed with a film that was much more sensitive to green that to red, would be represented on the final print by a dark gray.

2. A filter transmits its own color and absorbs best the complementary color.

   Example: We wish to photograph a flower colored yellow-orange, with leaves a vibrant pea-green color. The film we have on hand is equally sensitive to yellow-orange and to green. If we picture the plant without using a filter, we will probably see the flower and the leaves represented by the same gray halftone. If we use a green filter, we accentuate the brightness of the leaves and dim the brightness of the flower. A print from this negative would show the flower darker than its leaves, and would therefore be unsatisfactory because it is unnatural. If we use an orange or light red filter, we see in the print that we have darkened down the leaves and "jacked up" the brilliance of the flower. The result is what we have sought.

Space does not permit a lengthy treatment of the monochrome rendering of colored objects, but let the reader understand that in plant photography a knowledge of the use of color filters is a prerequisite if the photographer is to produce pictures that are technically good.

After having made a negative which meets with our approval, we become interested in the various printing techniques which will make a pleasing final result. In the matter of print making, there is nothing to be said applying exclusively to plant pictures. There are, to start with, three general types of papers which are used in photographic printing; slow, chloride papers, for contact printing; fast, bromide papers, for projection printing; and medium-speed chloro-bromide papers for prints by either method. All skilled print-makers use the chloro-bromide papers almost exclusively because of their delicate gradations and pleasing tonal warmth. It must be understood, however, that it is absolutely futile to expect superior results from one of these papers unless the manufacturers recommendations are religiously followed, especially with regard to the developer. There is a developer, advocated by Leo S. Pavelle, who incidentally, is probably the foremost exponent of modern printing technique, which seems to be the ideal formula for use with paper of this type. Contrary to similar advice in other lines, the best way and the fastest way to master the art of printing is to observe the technique of someone who is experienced, and not to learn the thing oneself. There are a few topical remarks that seem "à propos" at this point. Any of the control processes of printing, which, by the way, seem to be a dying fad, (gum printing, Bromoil, Autotype) are quite unsatisfactory for any type of nature photographs intended for scientific purposes. Paper surface is largely a matter of taste. For technical reasons dead matte paper is a bit more difficult to use, in that it has a noticeably short scale on the black end, i.e., it is not capable of recording as deep a black as other papers and consequently lacks brilliance. Glossy paper is generally not preferred but has the longest scale of any, and will produce the best print technically.

The question of composition is difficult to deal with abstractly; furthermore it is part of photography which is best taught by experience. We can but hope the data herein contained will be of some value.

The following are some recommended materials.

MAKE	FILM	PAPER (Projection)	PAPER DEVELOPER
Eastman	Panatomic-X	Vitava Vitava Opal Kodalure	D 52
Agfa	Isopan	Indiatone Portrait Enlarging Cykora	Agfa 135
Defender	Fine-Grained Pan.	Veltura	Mfgrs. recommended formula

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KNOW YOUR MUSEUM

The Squid

Of the many marine invertebrates in Maryland waters, I doubt if there are any more interesting than the squid.

The squids or sea-arrows are mollusks, although they do not in many ways resemble them in outward appearance.

Naturally when one speaks of mullusks one thinks of a soft bodied creature covered with a hard shell. In the squid the shell is degenerate and reduced to a mere internal scale imbedded in the mantle, called the "pen" on account of its shape.

Ten arms or tentacles surround the mouth of the creature, eight of which are furnished with two-rows of suckers on their inner side. The other two or fourth pair of arms are much longer and have suckers only upon their expanded tips where we find four rows of this organ of adhesion. The eyes are large and have no lids.

The squid usually swims backward. This is done by the water which is sucked in through the mantle-slit on the sides of the neck, and is discharged through the siphon which projects outward from the mantle cavity under the head.

The squid feeds upon small crustacea, fish, and even young squids which it seizes with its tentacles. It in turn serves as food for many fish.

It can change its color to match its surroundings. These color changes are produced by contracting and expanding pigment cells beneath the skin.

In the summer time the squids lay their eggs, which are gelantinous and somewhat finger shaped, upon weedy bottoms. Often they measure five to six inches in diameter.

E. B. F.

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FIDDLER CRABS

Mr. Elra Palmer of the Society's Staff, who is studying the distribution and habits of the Fiddler crabs (Genus Uca) in Maryland, requests information as to the location of colonies of members of this genus in Maryland.

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MARYLAND NATURE LOG
THE CYPRESS SWAMP

One usually associates the cypress tree with the Dismal Swamp of Virginia. But, why go to Virginia to see this stately conifer? Here in Maryland, the cypress (Taxodium distichum Linné) may be seen growing in its natural setting-a swamp.

In Calvert County, about a mile or so below Prince Frederick is a hard surface road marked Bowen. Turn right and proceed about a mile to the dirt road (hard packed) bear right on this road about a hundred feet. On the left side of the road, at this point, is the cypress swamp.

You need not venture onto the wet ground to see this wonder of the plant world - as many fine specimens may be seen from the roadway. However, by crossing a slightly dry field and following what appears to be a cowpath around the edge of the swamp one will get a much better view of the famous cypress knees.

In some instances the trees tower above you fifty to one hundred feet and may vary from ten to sixty inches in breadth. I have counted as high as sixty knees clustered around one of these forest giants.

This species of conifer (Taxodium distichum) is related to the fossilized cypress tree found in the Pleistocene of Maryland.

The cypress trees as found in Calvert County are secondary growth. The trees are cut for lumber and shingles, the latter being the more important.

Maryland is the furthest north that cypress is found in natural habitat and the station described is the most northern on the Western Shore.

Earl Palmer

NOTES FROM FIELD AND LABORATORY

Grasshopper Sparrow

On June 17, 1939 while observing birds in Loudon Park Cemetery I discovered the nest of a Grasshopper Sparrow (Ammodramus savannarum australis) containing two young. The female flushed from the nest as I trod near it. One of the young ran into the surrounding grass but it was captured and put back into the nest. It immediately left again and was followed by its nest-mate. Neither young used their wings, making good their escape on foot.

The nest was in a slight indentation in the ground near the middle of a large field. The surrounding grass was arched over the nest giving it a domed appearance.

The Grasshopper Sparrow is a fairly common summer resident in suitable localities about Baltimore, but the nest is so seldom found that any observation is deemed worthy of recording.

I. E. Hampe

Little Blue Heron

Three young of the Little Blue Heron were sighted over northeast Baltimore on July 1, 1939.

A. Selckmann

Ruddy Duck At Baltimore in Summer

On July 12, 1939 Mr. Irving Hampe and I visited the Patapsco Marshes within the city limits near Brooklyn to investigate the summer concentration of herons there. While engaged in this work we were surprised to see a male ruddy duck (Erismatura jamaicensis rubida). This species of duck normally departs from our territory before the end of May. The bird we saw was actively engaged in feeding by diving and showed no signs of any injury. However, we made no attempt to flush him and he may have been crippled in the wing. This at least is the most reasonable explanation of his presence here in mid-summer. There can be no doubt of the identification for he was in typical male summer plumage and we were able to watch him for nearly fifteen minutes at a distance of less than one hundred yards.

C. Haven Kolb

Downtown Birds

Sometimes one is inclined to doubt the effectiveness of the bird protection measure. However if one recalls the days when nothing but English Sparrows were seen in downtown sections, a sight such as we observed on the side lawn of the Catholic Cathedral, Mulberry and Cathedral Streets, is reassuring

On April 25th we observed three White-throated Sparrows, Two Starlings, a male and a female Cow Bird and about half a dozen English Sparrows; all peacefully feeding together. The birds seemed to realize that they were in safe territory and allowed one to get with ten or twelve feet of them.

Edward McColgan

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NOTES FOR THE MONTH OF JUNE

Meetings and Lectures at the Society

June 13 - Talk by Mr. W. Bryant Tyrrell, "Experiments with the Bob White".
20 - Talk by Mr. H. C. Robertson, "Reptiles of Frederick County".
27 - Talk by Mr. Elias Cohen, "Snake Venom in Medicine".

Junior Division

June 3 - Talk by Burtis Bennett, "Force Feeding of Snakes".
10 - Talk by Fred Bensinger, "Frogs of the Eastern United States".
Talk by James Bensinger, "My Museum".
17 - Talk by Joseph Bures, "My Experience with Birds in the Fields".
Talk by Wilmer Davison, "Human Side of 1938 Rock Hall Expedition".

June 24 - Talk by Miss Janet Byrns, "Wildcats".

Lectures, Exhibitions and School Loans

June 1 - Biology Clubs of Eastern High School, Lecture by Mr. E. M. Palmer, "Insects as a Hobby".
3 - W. B. A. L. (Rosyln Terhune) Talk by Elias Cohen.
6 - Enoch Pratt Free Library, Branch #11 - Loan of Insects.
6 - Pimlico School #223 - Loan of Muskrat.
6 - Fork School - Loan of two Habitat Groups, Minerals, six cases, Fossils.
8 - Baltimore City College, Biology Class, Talk by William Miller, "Snakes of Maryland".
8 - Baltimore City College, Biology Class, Talk by William Miller, "Snakes of Maryland".
8 - Baltimore City College, Biology Class, Talk by Romeo Mansueti, "Snakes of Maryland".
8 - Mayfield Herring Run Garden Section, Lecture by Mr. C. Haven Kolb, Jr., "Birds".
12 - Enoch Pratt Free Library - Loan of Birds.
21 - Biology Club, Western High School, Talk by Romeo Mansueti and William Miller, "Snakes of Maryland".

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The Natural History Society of Maryland

BULLETIN

Volume IX AUGUST, 1939 Number 12

GHOSTS OF THE SEASHORE
(Ocypode albicans, Bosc)

By Elra M. Palmer

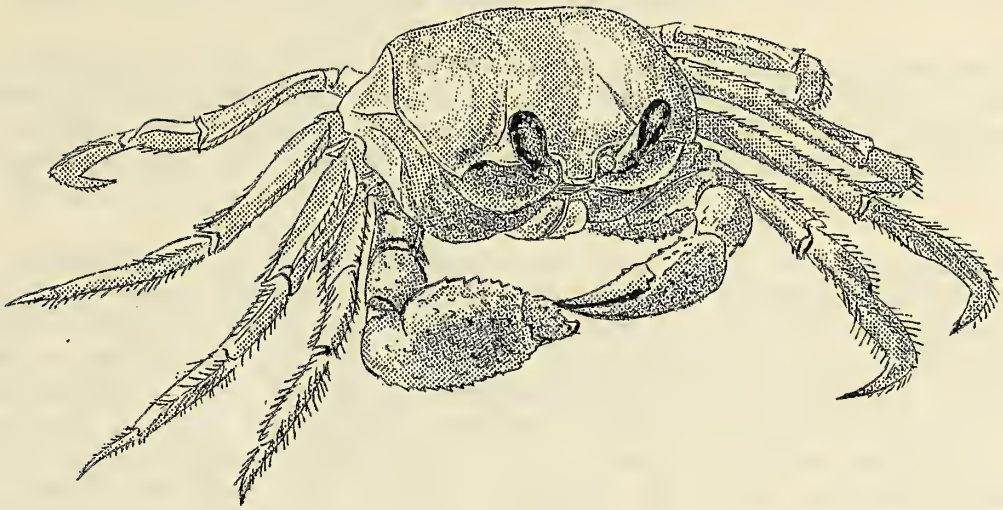
The casual visitor to the ocean shores seldom sees the ghost crabs. This is particularly true if he visits a crowded beach resort.

But an observant person strolling along the beach away from the crowds, where the sand has not been trampled, will soon notice a number of holes dug into the sand. Around one edge of each opening will be a neat pile of sand with innumerable tiny prints in it. Upon investigation it will probably be found that every hole seem to be unoccupied.

One may sit quietly about three or four yards from one of these openings and watch it closely. Soon he will be rewarded for his stillness. There will emerge, cautiously and slowly, a yellowish-grey white shadow, a mass of sand up and moving. The smallest movement on the part of the observer will cause this shadow-like creature to suddenly stop and squat so close to the sand that it seems to disappear. By closer observation one will notice at once two large brown and relatively large stalked eyes standing erect in the front of this shadowy square of grey, surrounded by hairy, flat legs. If the observer moves to get a better look, the little creature, with great dexterity rapidly disappears down its tunnel in the sand. The movement is so fast it leaves the impression of an illusion - a veritable ghost.

After one has seen his first crab on the beach he suddenly becomes aware of much movement and sees many more of these ghost or sand crabs, as they are commonly called. Some, busy excavating their homes, bring out virtually an armful of sand, toss it on the beach, look around, and then scamper back for more. Others prance around on the sand in a radius of three or four feet from their holes in search for food. All, if startled, will run rapidly sidewise for their burrows on those four pairs of fast moving ambulatory legs.

One may try his speed and agility by attempting to race a sand crab to its burrow. It was very amusing to watch a number of bathers



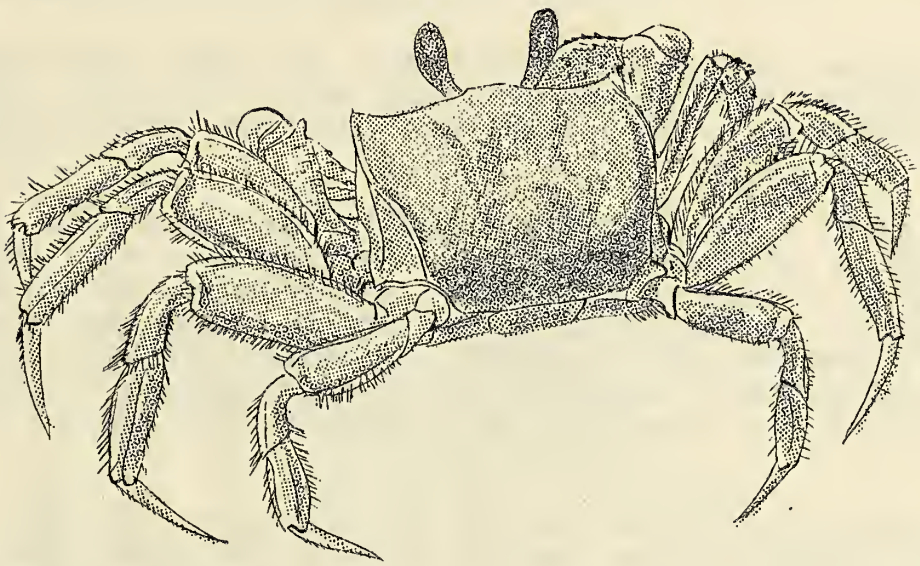
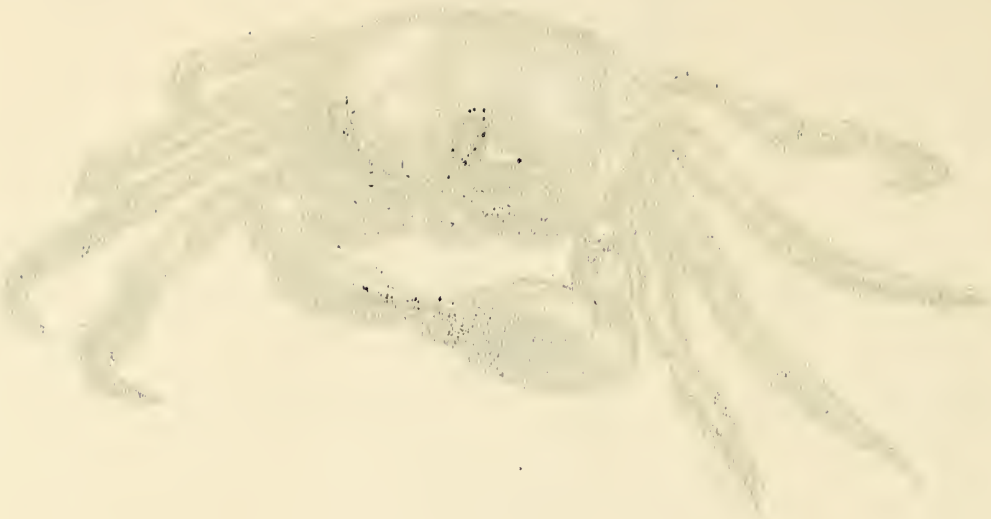
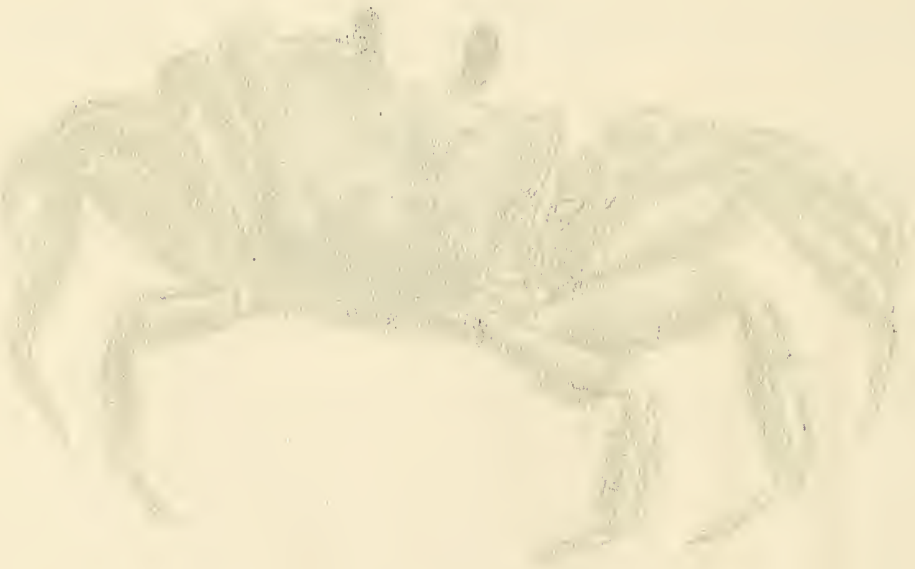


Figure 1.

Dorsal Views of Male Ghost Crab (Ocypode albicans) Showing Characteristic Pose, Flatness of Ambulatory Legs, and Stalked Eyes.





trying to do this. In all races observed the crabs were declared the winners without a photographic finish.

These crabs are partly nocturnal and usually remain in their burrows, or within a short distance of them during the daytime. They are most plentiful on the beach at dusk.

The burrows which Mr. A. Llewellyn Jones and I observed at Dewey Beach, Delaware, were nearly all above high tide. The openings varied with the size of the inhabitant. The smallest burrow observed had a diameter of 6 mm., while the largest measured 42 mm.

The tunnels were not vertical to the beach but placed at a slight angle, some tilting toward the ocean, others toward the land. All of the burrows which we dug out ended in wet, hard packed sand. There were no indications of any branch tunnels or chamber-like structures. The deepest burrow was two feet eight inches. (R. P. Cowles (1908) reported a burrow of 4 feet, 2.5 inches near the Tortugas Laboratory, Florida.) In every burrow which we excavated one specimen was found, except in four burrows where we were unable to locate any inhabitant. The crabs dug up were covered with wet sand and were motionless, with legs folded, apparently to escape detection. The entrances to all the tunnels were well surrounded with innumerable tracks.

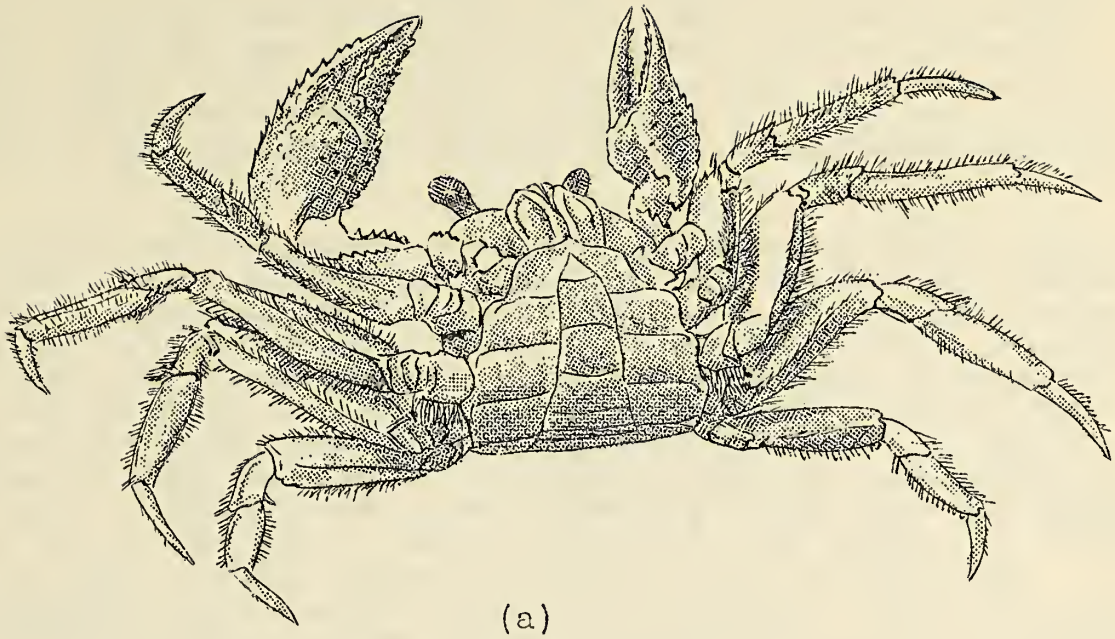
At Ocean City, Maryland, few burrows were noted on the beach, even at night, but quite a few were found under the boardwalk, where the crabs undoubtedly collected much refuse which fell through the planking.

At dusk, and during the night as well as in the early morning the sand crabs were most active and hundreds could be observed congregating along the drift-line of the beach in search of food. These crabs are true scavengers of the beach, as they feed on vegetable matter as well as animal material. Several times we saw them clawing vigorously at a large mass of brown algae. Tearing some strands loose from the mass, they scampered up the beach and down their burrows.

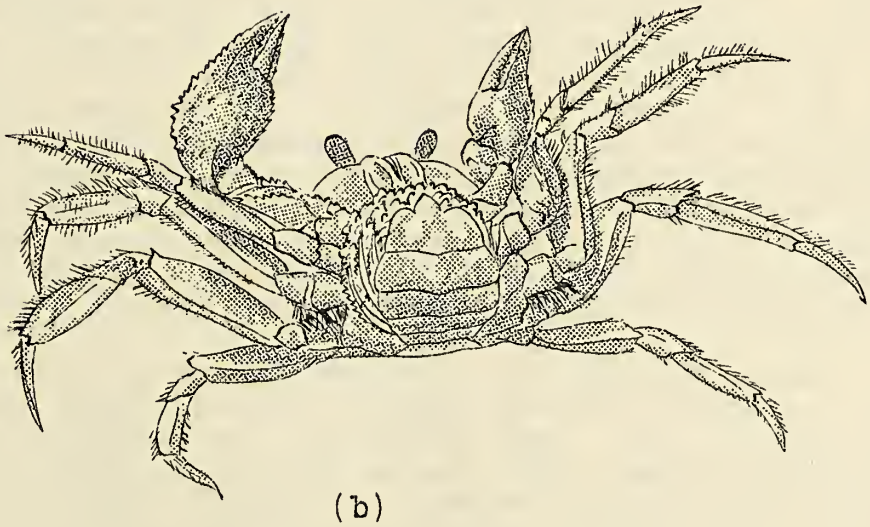
A small smooth dogfish, which we had caugh surf fishing and thrown upon the beach, was promptly pecked at by a ghost crab. But apparently their commonest diet as far as we could observe, both at Dewey Beach, Delaware and Ocean City, Maryland, consisted of the "sand bugs", or mole shrimp, Hippa talpodia. The crabs would advance out on the beach to where the waves were washing in, and as a wave would break in they would scamper around, seize a "sand bug" and run up on the beach to either eat it there or carry it to its tunnel.

Early one afternoon two or three ghost crabs which had been shot with a .22 rifle were seen lying on the beach. At dusk we noted two or three crabs devouring these scattered remains of their brethren.

We found it comparatively simple to collect the crabs at dusk or during the night as they venture much further from their burrows at such times, and by using a flashlight, which when turned on the crabs caused them to stand still and stare at the light, we could easily approach and pick them up with a net or gloved hand.



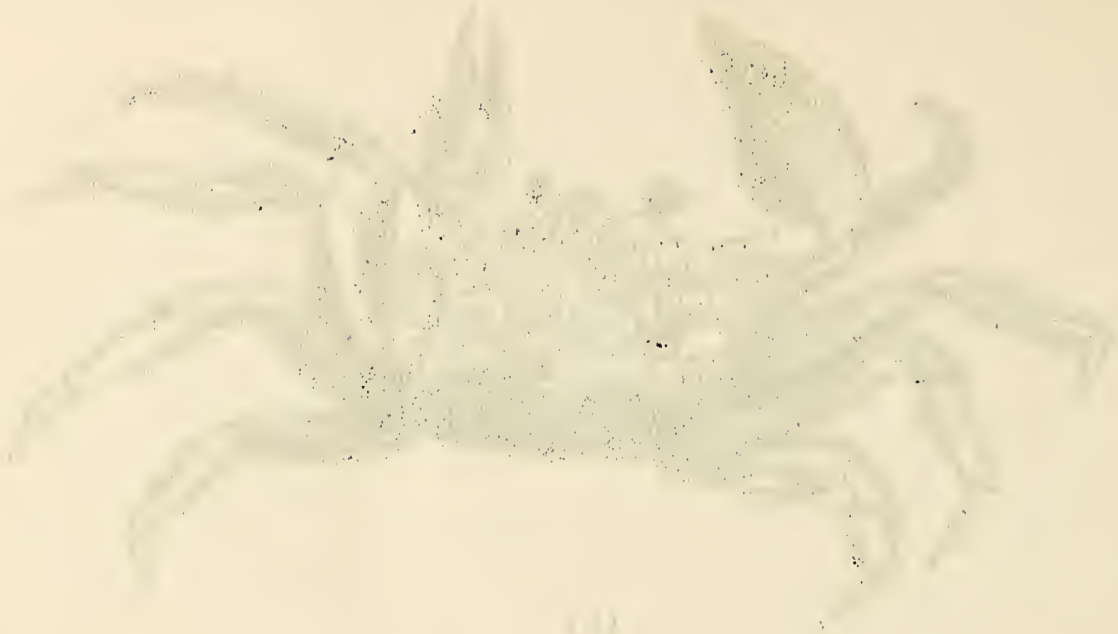
(a)

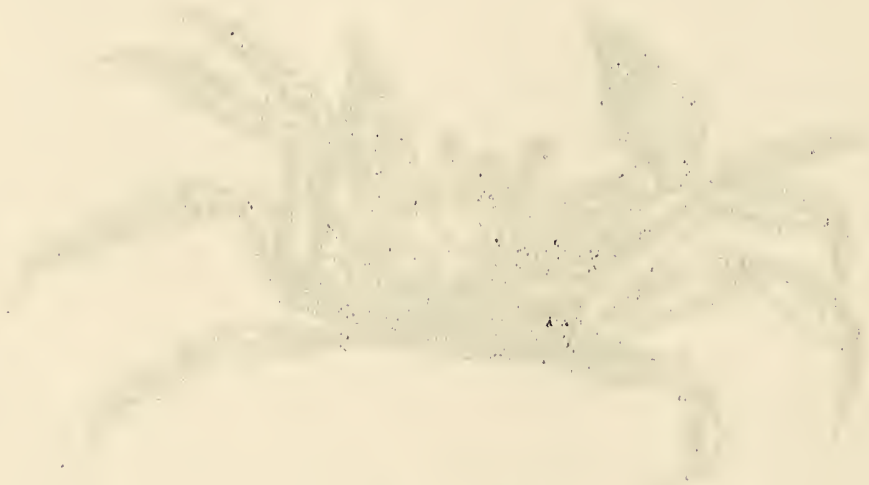


(b)

Figure 2.
(a) Male (b) Female with Sponge

Ventral Views of Ghost Crab (Ocypode albicans) Showing Apron Structure; and Hair-fringed Orifices between the Bases of the Second and Third Pairs of True Legs.





The crabs, when startled will first attempt to run up the beach to their tunnels but if cornered, will dash right out into the surf. They are rolled around usually for a few minutes and then cast up on the beach, where they scamper away just as good as ever. A large male cornered by Mr. Jones, at Dewey Beach, Delaware, ran out into the surf four times, and was chased up and down along the drift-line for eighteen minutes before it apparently became exhausted. When picked up the crab was quite limp and it was nearly five minutes before it resumednormal activity.

Thirty-seven specimens were observed carrying food. With the use of the flashlight and a pair of long forceps we attempted to take the material away from the crabs. In twenty-nine cases as soon as we had the material by the forceps the crabs released their hold. Eighteen of these individuals ran away immediately after the surrender of the food. In eight cases observed the crabs held on to the material tenaciously, two of these individuals grabbing the material out of the forceps after we had pulled it from them. Twenty-six crabs were carrying "sand bugs" (H. talpodia) four of which were alive. Five individuals had fragments of squid, used for surf fishing. Three had parts of the calico crab, (O. ocellatus), and one had an immature anchovy. Two crabs carried animal matter which we were unable to identify. The few specimens which Mr. Milton Oler, Jr., and I observed at night in Ocean City, Maryland all had "sand bugs" or fragments of them in their chela.

A considerable variation in coloration was noted. Some specimens were sandy-yellow in color, others a dark grey. All of the small immature specimens taken had a salt and pepper color pattern on the carapace as well as the legs, and a yellow-orange blotch in the branchial regions near the cervical groove. R. P. Cowles, after extensive experimentation, reported that the sand crabs have the power to change color, and that it is apparently dependent upon the intensity of light. Individuals emerging from their burrows in daytime are dark in color, but this color seems to fade when they are in the sunlight. Specimens kept in the shade of the laboratory become darker than those in the sunlight.

This interesting brachyuran, Ocypode albicans, has a carapace square in shape (Fig. 1) with distinct lateral margins. The regions of the carapace are poorly defined. The chelipeds are small and quite unequal in both sexes. The larger chela has a vertical stridulating ridge of tubercles on the inner side close to the base of the immovable finger. The ambulatory legs are broad and flat with pointed dactyli. These legs are not very granular and are fringed with long yellowish hair, the second pair of legs being the longest. "There is an orfi orifice or recess, the edge of which is thickly fringed with hair, between the bases of the second and third pairs of true legs" (Rathbun). (See Figure 2)

The abdomen is composed of seven segments in both sexes. The segments of the female abdomen are broader than that of the male. (Figure 2). There does not appear to be any difference in coloration or size of chelipeds between the sexes.

Fifteen specimens were collected at Dewey Beach, Delaware.

(Jones and Palmer, July 25-29, 1939): Seven females, five with large left chela, two with large right chela, and eight males, five with large right chela and three with large left chelipeds. The largest female was a sponge crab, whose carapace measured 37 mm. in width and 29 mm. in length. The carapace of the largest male measured 43 mm. in width and 35 mm. in length.

Of fourteen individuals collected at Ocean City, Maryland, (Oler and Palmer) eight were males and six were females. Seven males possessed large right chela, and one, a large left. Four of the females had large left chela and only two, large right chelipeds. The smallest crab caught was at Ocean City, Maryland, August 19, 1939. Its carapace measured 5 mm. wide and 4 mm. in length.

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PRELIMINARY REPORT ON FOSSIL WHALE MANDIBLES

By O. L. Helm

Because of their medium, and the lack of physical barriers, whales could be expected to be widely dispersed. The fossil remains of these animals naturally would be widespread also. The Cetaceans appear in great numbers during the Miocene Period in the Northern Hemisphere. However, despite their numbers the skeletal remains are found only in parts in the forms of skulls, ribs, mandibles, vertebrae, etc. It is on these fragmentary portions of huge animals that we attempt to trace the history and relationships of these water-dwelling mammals.

It many features the skeleton of whales is highly distinctive of the order. One of the chief facts which argue a primitive position among mammals for the Cetacea is the slight union of the rami of the lower jaw. The rami of the mandibles arch outwards, their anterior ends meet at an angle, and connect by fibrous tissue without any true symphysis. The rami are widely separated posteriorly and have a still further outward sweep before they meet in front, giving the floor of the mouth the shape of an immense spoon. The shape of the mandibles, the presence and types of teeth, or the absence of teeth help determine the different members of this group of mammals.

In the Sub-order Mystacoceti the teeth are never functionally developed, being present in the foetal stage only but replaced in the adult by the baleen, or whalebone. During this stage of their life the Mystacocetes have numerous calcified teeth lying in the dental groove of both upper and lower jaws. No trace of the teeth remains after birth.

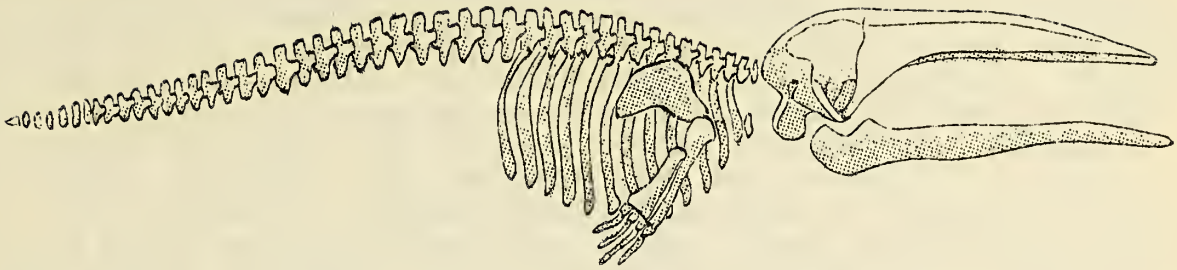

Fig. 1

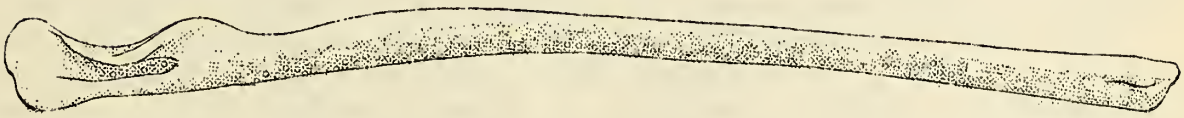

Fig. 2

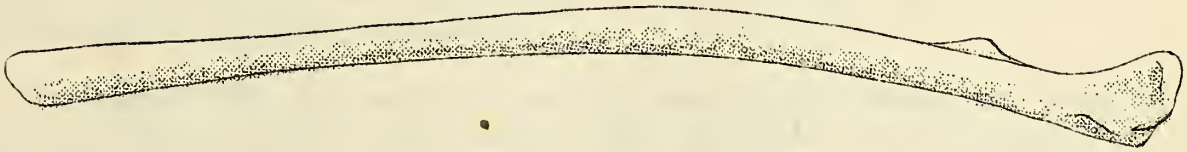

Fig. 3

Fig. 1 - Diagrammatic Representation of Relative Position of Mandibles of the Whalebone Whale.

Fig. 2 - External View of Left Mandible Siphonocetus priscus (Leidy)

Fig. 3 - Internal View of Left Mandible Siphonocetus priscus (Leidy)

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In 1932 two whale mandibles were found by J. Calder and E. M. Palmer at Governor's Run, three quarters of a mile north of the road at Calvert Cliffs. The mandibles are complete and are splendidly preserved specimens.

Most identifications made by early workers in the field of paleontology are based on fragmentary and badly damaged specimens. Until more of the marine faunas of Miocene formation are thoroughly known most specimens will be determined only tentatively. When skulls of whales are found associated with mandibles most of the undetermined specimens can be more easily identified. Usually, when a skull is found, the mandibles are not present, or vice versa. This leads to separate identification and naming of specimens that might belong to the same group. Some of the earlier paleontologists described far more kinds of Cetaceans than actually exist in these formations, naming every fragment that came into their possession.

The temporary identification of the two complete mandibles that we have is based on a fragment of lower jaw found in association with Crocodilus antiquus, Pecten jeffersonius, etc., in Westmoreland County, Virginia. The genera of the Miocene beds are based on the various stages of roofing, fusion, or obliteration of the gingival groove and dental canal. The above mentioned specimen and the two mandibles described in this article fall into the group in which the gingival groove is distinct from the dental canal, with the gingival canal roofed over and perforated. The tentative name given to our two mandibles is "Siphonocetus priscus, (Leidy)".

The mandibles in our possession are quite large and came from a comparatively large whale. The condyle is large with a deep and wide groove on the external surface. A shallower and more narrow groove is on the inner surface. The superior border extends obliquely inward and downward from the condyle, then rises in a convex curve to the coronoid, forming a roof over the posterior orifice of the dentary canal. The internal surface of the ramus has a convex shape posteriorly. The surface flattens gradually anteriorly until it meets in a sharp edge at the tip of the ramus. The external surface of the ramus, anterior to the coronoid, is convex, but more rounded than the inner surface, and almost completely round at approximately the middle of the mandible. This surface flattens very gradually as it approaches the tip, then flattens abruptly for the last 3mm. to meet in a sharp edge. The alveolae, five in number, lying externally to the superior border, open anteriorly and downward. They are from .4 mm. to .7 mm. in diameter and extend anteriorly as grooves from 3 to 6 mm. long. The gingival groove opens anteriorly at the tip of the ramus in an orifice 5 mm. in diameter. There are eleven tiny fossae on the inner surface just below the superior border, the three most anterior of the group extending as shallow grooves. In general, the outline of the mandible is that of a long bow flattened instead of curved in the middle.

<u>Mandible measurements</u> (left mandible complete)

Transverse diameter at point 500 mm. anterior to condyle...47.82 mm
Vertical diameter " " " " " " " ...68.25

Transverse diameter	at	point	750	mm.	anterior	to	condyle	...52.38mm
Vertical diameter	"	"	"	"	"	"	"	...66.67
Transverse diameter	"	"	1000	"	"	"	"	...50.8
Vertical diameter	"	"	"	"	"	"	"	...61.86

Greatest length (outside measurements) along external curvature 1536.7

Transverse diameter of condyle	72.92
Vertical diameter " "	111.08

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KNOW YOUR MUSEUM

The Summer School Nature Art Class

This year the Society introduced an entirely new phase in its Summer School courses held at the Society's Museum, the Maryland House, in Druid Hill Park.

The idea was to combine the two studies - nature and art, and in this we had a two-fold purpose. First we wished to apply designs or illustrations to what was learned in the field of nature, and to make the studies more interesting to the student, the designs were painted on plates and plaques. Secondly, we wished to teach the drawing of anatomical subjects in conjunction with the nature lessons.

Besides sketching and painting, leaf casting was also taught.

Probably the most truly outstanding achievement of the Nature Art Class was a cooperative nature mural. This work offered every art student a part in its execution, the students expressing their ideas in the part of most interest to them.

An exhibition of the work of the Summer School is now being displayed at the Maryland House, and we believe the students have done very creditably, demonstrating not only what can be accomplished by young people, but also how eager our youth is to take advantage of this unusual type of opportunity.

This year's Summer School was the most successful ever conducted by the Society, and there was a fine spirit of cooperation between pupils and teachers. The enrollment of all the classes totaled eighty-seven. In addition to nature art, birds, reptiles, insects, and trees were studied. Classes were held five days each week from July 18th to August 11th with the exception of the Art Class, which continued until August 30th.

The Staff consisted of: Elra M. Palmer, Director and Instructor in Plant, Insect, and Reptile Study; Haven Kolb, Instructor in Bird Study; J. Wesley Moore, Instructor in Nature Art; Herbert Moorefield and Edmund B. Fladung, Substitute Instructors in Insect Study and Bird Study, respectively, and Romeo Mansueti, Assistant in Reptile Study.

E. B. F.

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NOTES FROM FIELD AND LABORATORY

An Observation on the Economic Value of the Pilot Blacksnake-Elaphe Obsoleta Obsoleta (Say)

June 12, 1939, while on a field trip to Gunpowder Falls, Baltimore County, I found the body of a two and a half foot Pilot Blacksnake - just killed and still moving. The reptile had been destroyed on a much used path; in fact I had traversed the spot where the serpent was killed only fifteen minutes before I discovered it. Squashed from the snake's body were five adult field mice that had been recently swallowed. The path where the serpent had been killed led to a stream and the body of the reptile was scarcely three yards from the water. I believe that the snake, after its recent meal, was led by thirst to glide along that path and was killed by an ignorant person. This species of reptile is of much value to the agriculturist as it is able to capture and destroy larger numbers of rodents than any human devised trap - also, the Pilot Blacksnake is a "self-setting trap".

Elias Cohen

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NOTES FOR THE MONTH OF JULY

Meetings and Lectures at the Society

July 11 - Talk by Edward McColgan, "Bird Banding".
18 - Talk by August Selckmann, "Ospreys of the Eastern Shore".
25 - Talk by Charles W. Ostrander, "Chrome and Chrome Localities of Maryland".

Junior Division

July 8 - Business Meeting.
15 - Talk by Mr. Price Piquett, "Honey Bees and Their Hives".
23 - Talk by Albert Seitz, "Garnets", and Louis Hughes, "Japanese Bettle".
29 - Talk by William Moorefield, "Ant Lions".

Lectures, Exhibitions and School Loans

July 6 - Enoch Pratt Free Library - 3 Habitat Groups.

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The Natural History Society of Maryland

BULLETIN

Volume X SEPTEMBER, 1939 Number 1

TYPES OF BIRDS' NESTS

By Bruce R. Overington

In the dim past, according to the theory of natural selection, it seems probable that the primitive species of birds laid their eggs at random under varying conditions. Many of the eggs were destroyed and others failed to hatch at all, depending on their chance surroundings. Some, however, the best concealed or best located, no doubt hatched and their species were continued. And so, through succeeding generations new habits were formed, likes and dislikes were developed, which led to the great diversity of nesting behavior which we observe in the birds of to-day.

Food is the main drive in life, reproduction is second. Therefore, the marginal area of the food supply is the area of greatest competition where weaker individuals or species are destroyed or abnormal modes of life, such as parasitism, are developed. Nature may have made a million experiments before developing successful species. Even in our time less resistent kinds have disappeared forever. The needs of birdlife are greatest and most critical during the first few weeks after the young ones leave the egg, and so additions to the population must be made when food is most plentiful and the weather most favorable.

This period when conditions are at their best varies greatly according to the species involved and so the nesting season lasts from January, in the case of some of our owls, to August in the case of the American Goldfinch. During this nesting period birds are at the peak of their activity and do more interesting things than at any other time in their lives. Usually soon after their return from the South, nest building commences and the date varies but little from year to year. There is no set rule that will be followed but each species can be depended upon to build a nest that is typical of its species. Even in the same family there may be many different architectural plans though they will be similar in some respects. On the other hand, unrelated or distantly related families may have some habits that are the same due to convergent adaptation to similar circumstances. Some of the causes behind the great variety of nest-building habits are hidden but others are easily discovered.

One of the most peculiar nest builders in the world is the mound builder of Australia. The earlier explorers, on seeing the huge mounds, (some of them fifty feet in circumference and over ten feet high) thought they were burial mounds of the natives. They are composed of sand, earth, and rotten vegetation. The Mallee-Fowl lay their eggs on the heap and cover them over with rotten vegetation. The heat from this natural incubator is sufficient to hatch the eggs. The young are hatched fully feathered and are able to run at once. The young have never known their parents because as soon as the eggs are laid the mother bird disregards all nesting duties.

In our country some species such as the Kingfisher and Bank Swallow build holes in the ground. At the end of these burrows are laid the eggs, which are white. With the Kingfisher the burrow is usually from six to eight feet long and several feet from the top of the bank. It usually takes from one to two weeks to complete. The eggs are laid on the bare earth but sometimes on indigestible fish bones or crawfish remains.

A great many more birds lay their eggs on the bare ground without any covering. The goatsuckers are good examples of this type. Their eggs are so well blended in with the spot where they are laid that unless you have seen the bird rise at your feet and know that the eggs are there, you may walk right over them and not see them. The young of the Whip-poor-will is a downy red which harmonizes and blends in every way with the dead leaves among which they are raised.

One of the most beautiful nests is that of the Blue-gray Gnatcatcher. Its nest resembles very closely that of the Ruby-throated Hummingbird, but the walls are much thicker and higher. The architecture is rather frail and the nest is usually saddled on an upright limb or in a crotch. The interior is deeply rounded and lined with a soft cotton-like substance, horsehair, and occasionally, feathers. The outside is very beautifully covered with lichens, and at first glance one would suppose it to be a small knot on the tree. How many times has this artifice saved the family from natural enemies!

Great numbers of birds nest in the highest branches of the trees and still others build at the ends of branches which sway in the wind. The woven basket of the Baltimore Oriole is swung in the latter situation. I once saw such a nest, the greater part of which had been made of silk yarn. The man who owned it told me that it had been built in a tree beside a silk mill and that the bird had collected the different colored strands and had matted them together to resemble felt. A number of horsehairs had been passed through the fibre and it had been sewed together with large and rather irregular stitches. It was a long nest, six or seven inches in depth, and with an opening suitable in size for the entrance of the female. At the bottom of the nest a heap of soft material was placed. Among the orioles the female is the designer of the nest. The male brings the material but the female sometimes rejects it. After examining such a nest I think it is impossible that the structure could be made by mechanical instinct rather than by intelligence. I believe the higher animals have intelligence so that by experience they can add to their instinct.

The American Osprey builds an enormous nest of sticks to which it adds year after year until it becomes of immense size. I have seen these nests on telegraph poles, barns, and, on occasion, when the nests have fallen to the ground I have seen the birds take up their residence there and apparently seem quite at home. On one occasion, I saw a pair of Red Squirrels using the bottom of the nest and owner and tenant seemed to be on very good terms. The inside of this platform of large sticks has a cup-shaped depression in the middle which is lined with grasses and a bit of seaweed. A piece of a pine branch or anything else to which the bird might take a fancy is sometimes added. The nest of the Bald Eagle is usually larger. I have heard of one that had been used for fifty years. One one occasion I climbed an eagle's nest that was being used by a Great Horned Owl. The owl breeds somewhat earlier than the eagle and I wondered what happened when the eagle found the new tenant in full possession.

Some of our birds chisel into the solid trees and scoop out quite a cavity for their home sites. Here they feel quite safe and comfortable, protected from their natural enemies by the solid tree. Again, other species use old holes abandoned by their makers. Many of our large owls use natural cavities in the trees for raising their young. The Barred Owls do this; but once in my locality I found them using an abandoned Crow's nest. The Long-eared Owl uses such deserted nests but the Short-eared Owl builds its own nest in a marshy place under a bush or close to an old log and lines it with sticks and weeds. It is hardly to be believed that a shorebird would have this habit of utilizing the discarded nests of other species, yet the eggs of the Solitary Sandpiper were found in an old Robin's nest some feet above the ground.

The doves, herons, cuckoos, and some others weave such a slight platform of sticks that the eggs can be seen from the ground below. The California Condor uses a cave on some inaccessible cliff for its aery. The Duck Hawk and the Prairie Falcon use a small niche in a high cliff where they may brood on their eggs and at the same time keep a sharp lookout for the food supply. The Murres deposit their eggs in large numbers on bare rock cliffs. One end of the egg is quite small while the other end is large, a shape which, by causing the eggs to roll in short circles, prevents it from rolling off the cliff.

Any location that offers hidden safety and comfort will be found and used.

Some years ago a Robin built a nest high in a maple tree in my yard, and I have always suspected that a Blue Jay destroyed the Robin eggs that were laid. The following year two English Sparrows took possession of the Robin nest and started to build their flimsy nest on top of the substantial structure of the Robin. They gathered grasses and feathers from the yard and worked very industriously until the nest seemed to be finished. Then one day I imagined that the female was sitting on a full clutch of eggs in perfect safety. On coming home I noticed pieces of grass coming down in a steady stream from the maple. Looking up I was surprised to see a Blue Jay gradually tearing the nest to pieces. I watched it until the work of destruction seemed to have been completed. Then it seemed to take several big gulps of something, after which it went on its way rejoicing.

Cowbirds do not make any nest at all but deposit their eggs in the nests of other birds. The unfortunate foster parents have to hatch and feed the undesirables that are forced upon them so ruthlessly. The young Cowbird develops much faster than the young of the nest's owner and in consequence it crowds out the owners' which usually starve if they are as small as a warbler. I once thought that the Yellow Warbler showed lots of intelligence because as soon as a Cowbird had laid an egg in her nest she would show much excitement and then get busy and build another nest over top of the first one, covering the Cowbird's egg. If, however, an acorn is dropped in the nest she will do the same thing.

Several years ago I tried an experiment. I caught a young Killdeer. I found a tin pan about twelve inches in circumference and about five inches high. While the female was hovering around in a highly excited condition, I put the little Killdeer in the tin pan and then moved back where I could see how the old bird would get the young one over the edge of the pan. Very soon the old Killdeer returned to the pan and should have seen the young one before alighting. Round and round the pan the mother went and I could plainly hear the old one and the young calling to each other. Round and round, but never a thought of looking over the top. After half an hour of this my patience gave out and I returned and liberated the young bird.

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NOTES ON THE MAMMALS OF THE PATAPSCO STATE PARK

By Irving E. Hampe

The Patapsco State Park, probably the best known recreational area in the state, is situated along the Patapsco River between Relay and Hollofield, only eleven miles from the City Hall of Baltimore. This tract lies partly in Baltimore County and partly in Howard County. It contains 1,129 acres, state owned and 1,100 acres in cooperative auxiliary forest.

For almost the entire length of the park the Patapsco River flows through a deep, broad gorge, the high hills on either side being covered with deciduous forest. These hills rise to an elevation of 250 feet above the river. From the plateaus above flow numerous streams which, as they tumble over rocky ledges, produce cascades and miniature waterfalls. The river itself, hurrying along in rapid descent for the most part, but occasionally moving lazily, is the dominant feature of the landscape.

The writer became interested in studying the mammals of this area while camping near Glenartney during the summer of 1934. As a result numerous week-end trips have been made especially to trap and observe the mammal life. Trapping is necessary to procure and study the mice and shrews. The larger mammals are more easily observed, and are also protected within the confines of the Park. Much data on the larger species was secured from campers and from farmers in the vicinity.

The following list was compiled principally from notes and specimens collected by the writer.

1. Opossum Didelphis virginiana virginiana
This species seems to be rather common. Automobiles kill many of them as they cross the roads. As many as twenty carcasses have been found in one year. No specimens have been taken, nor any observations made other than those made on animals killed on the roads. Farmers and campers report the opossum plentiful.

2. Eastern Mole Scalopus aquaticus aquaticus
Mole runways are common throughout the Park. Traps set in the runways were merely pushed aside when the moles made repairs to the breaks. Mice and shrews used these runways and numerous specimens have been taken. One mole was found dead above ground during the summer of 1934.

3. Maryland Shrew Sorex fontinalis
This tiny mammal has been trapped in the marshy pastures near Glenartney. Seven specimens collected by the writer are now in the Society's collection. An account of the breeding of the species has been published in the Society's Bulletin. (See Bibliography).

4. Short-tailed Shrew Blarina brevicauda talpoides
This shrew is one of the most common mammals in the Park. Wherever traps are set the short-tailed shrew is sure to be taken. This species is active throughout the year. Males predominate among the specimens taken. Pregnant females have been taken from February to November.

5. Little Brown Bat Myotis lucifugus lucifugus
The Little Brown Bat seems to be the most common bat in the area during the summer. No specimens have been taken in the Park although a number have been taken from the surrounding territory.

6. Georgian Bat Pipistrellus subflavus subflavus
There is a single record for this species. One was captured by the writer on January 23, 1937, among the rocks on a hillside near Orange Grove Station. It escaped from its cage the nest day.

7. Big Brown Bat Eptesicus fuscus fuscus
The Big Brown Bat may be more common than the records reveal. The difficulties encountered in observing and capturing bats preclude any lengthy statement about their status. Several specimens have been taken in and around the Park during the winter when the bats were hibernating. Sheds and barns are favorite places for hibernating bats.

8. Red Bat Nycteris borealis borealis
One specimen of the Red Bat has been taken in the Park. It was found under a bridge on October 31, 1937.

9. Raccoon Procyon lotor lotor
A mounted raccoon in the Society's collection is labled Orange Grove, Patapsco State Park. The date of capture is not known. It was killed by Boy Scouts and mounted. Also a farmer in the vicinity killed a raccoon in the spring of 1939. The writer examined the skin several months later.

10. Weasel Mustela frenata noveboracensis
Farmers in the vicinity report this species to be common. The only specimen secured is a mutilated skin with the head missing. It was found under a Barred Owl nest near Relay on May 10, 1939.

11. Eastern Skunk Mephitis mephitis nigra
This species has been reported many times by campers in the Park. The writer observed one on the river road near Vineyard on the night of August 1, 1936.

12. Red Fox Vulpes fulva fulva
Farmers report this species as uncommon. The site of a reputed den was visited during the past summer, but it was not occupied. In digging about the entrance a mass of chicken and rodent bones was uncovered. The writer has distinct recollections of several observations made some years before the present study was started.

13. Woodchuck Marmota monax monax
The woodchuck is very abundant throughout the Park. Numerous burrows may be found in the hillsides along the river. Observations are too numerous to cite. One specimen, now in the Society's collection, was found dead near Vineyard on April 30, 1933.

14. Chipmunk Tamias striatus fisheri
This pretty little rodent is very numerous, About the first of March they come out of hibernation and may be observed until late in November. A male in breeding condition was trapped by the writer at Glenartney on March 9, 1935.

15. Red Squirrel Tamiasciurus hudsonicus loquax
The Chickaree or Red Squirrel is not very common in this area. It is usually observed in pine woods. One was recorded near Avalon on April 3, 1938.

16. Gray Squirrel Sciurus carolinensis carolinensis
The most common squirrel in the Park. No specimens have been taken, although observations have been made during every month of the year. Young squirrels are numerous after the first of July.

17. Flying Squirrels Glaucomys volans volans
This beautiful, nocturnal creature is probably fairly common. Due to its nocturnal habits it is not often seen. One was observed at twilight on May 22, 1936.

18. White-footed Mouse Peromyscus lencopus noveboracensis
This mouse is the most common mammal found in the Park. Specimens have been taken on every trip. The males of this species are more frequently trapped than the females. The species evidently breeds during the greater part of the year. Females containing as high as six foetuses have been taken.

19. Eastern Meadow Mouse Microtus pennsylvanicus pennsylvanicus
This species seems to be very abundant although no speci-

mens have been trapped. Owl pellets collected under nests and roosts contain a large percentage of Microtus remains.

20. Pine Mouse Pitymys pinetorum scalopsoides
There is only one record of this mammal for the Park. A specimen was trapped at Glenartney on April 15, 1934.

21. Muskrat Ondatra zibethica macrodon
A single sight record and several reports from campers are all the data known to date. The occurrence of the muskrat in the Park is to be expected as it is quite common in the surrounding area.

22. House Mouse Musculus musculus musculus
This introduced rodent is fairly common and has been taken quite frequently. One trapped on March 9, 1935 was partly eaten by a Short-tailed Shrew that was caught by the leg in the same trap.

23. Norway Rat Rattus norvegicus
This pest is common around barns and houses in the vicinity of the Park. It has been observed frequently although no specimens have been taken.

24. Jumping Mouse Zapus hudsonicus americanus
On May 1, 1937 a Jumping Mouse was caught by hand in the tall grass near the resevoir at Glenartney. This is the only record for the Park.

25. Cottontail Rabbit Sylvilagus floridanus mallurus
The Cottontail is very common in the Park and surrounding territory. No specimens have been taken, but sight records are numerous.

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NOTES ON THE TAXONOMY OF THE GENUS 'CHAOS'

By Henry C. Eichhorn, Jr.

The following is a complete outline of the classification of the organisms to be discussed in this article:

I. Phylum: PROTOZOA (Goldfuss, 1817)
  A. Class: RHIZOPODA (Siebold, 1845)

1. Order: LOBOSA (Carpenter, 1861)
   a. Suborder: AMOEBAEA (Ehrenberg, 1830)
      (1). Family: CHAIDAE (Poche, 1913)
         (a). Genus: CHAOS (Linnaeus, 1767)

Type species: Chaos chaos Linnaeus
Species: Chaos diffluens Mueller

In 1755, in his Insecten Belustigungen, Roesel von Rosenhof, a German artist and amateur naturalist, described and drew a plate of an extremely large ameba which he called "der kleine Proteus." Three years later, in 1758, Linnaeus, in the tenth edition of the Systema Naturae, catalogued the species without having observed a specimen, and named it Volvox chaos. This is to say, he placed it in the same genus as the common, green colonial flagellate Volvox globator, from which Roesel's organism is entirely dissimilar. Probably realizing that he had erred in placing the species in this genus, Linnaeus later erected a new genus for the species, and the valid name for Roesel von Rosenhof's organism became Chaos chaos Linnaeus. This was in 1767, in the twelfth edition of the Systema Naturae.

In 1822, Bory de Saint Vincent renamed the ameba Amiba roeseli. This latter name is invalid since (1) "Amiba" is French, and the International Rules of Nomenclature require a Latin or a Latinized form for scientific names; and (2) a valid genus and species (Chaos chaos) had already been erected for Roesel's organism.

Chaos chaos was seen again by H. V. Wilson in Chapel Hill, North Carolina in 1900. Thinking he had found a new species, Wilson described the ameba under the name Pelomyxa carolinensis. This species is very similar to Chaos chaos, and is generally considered synonymous with the latter species.

The species was observed again in Virginia by W. A. Kepner in 1916. He recognized the species as Pelomyxa carolinensis.

In 1936, Dr. Asa A. Schaeffer observed the species in Tennessee and from a marsh in New Jersey. He recognized the valid name, Chaos chaos since previously, in 1936, in his Taxonomy of the Amebas, he had thoroughly discussed the status of the species. He cultured the ameba successfully and made it commercially available for study and research under the name Chaos chaos Linnaeus.

Synonomy

1755 - Roesel - "der kleine Proteus"
1758 - Linnaeus - Volvox chaos
1767 - Linnaeus - Chaos chaos (Valid name)
1822 - Bory - Amiba roeseli (Invalid)
1900 - Wilson - Pelomyxa carolinensis (Synonym)
1936 - Schaeffer - Chaos chaos Linnaeus

In 1786, O. F. Mueller discovered a second and smaller species of ameba which he called Proteus diffluens which was similar in morphology to Roesel's Chaos chaos. The generic name of this species is invalid since Laurenti had used Proteus for a genus of salamanders in 1768. The specific name diffluens, however, is valid.

Bory de Saint Vincent renamed Mueller's ameba Amiba mulleri in 1822. This name is invalid since (1) the generic name is a French form, and (2) the valid specific name had already been established as diffluens.

C. G. Ehrenberg, in 1838, Latinized Bory's Amiba to Amoeba and described two species under the genus. These two species were Amoeba princeps and Amoeba diffluens. Of the two, A. princeps is a synonym of Mueller's diffluens, and Ehrenberg's A. diffluens is unknown to modern investigators. Thus, at this time, the valid name for Mueller's ameba was Amoeba diffluens with Ehrenberg's Amoeba and Mueller's species diffluens.

In 1879, in his monumental work Rhizopoda of North America, Leidy applied the name Amoeba proteus to a species whose specific characteristics fit three separate and distinct species of ameba. Among these is Mueller's ameba (A. diffluens), the common laboratory ameba. This name (A. proteus) was applied to the former, and, although incorrect, became widespread and widely accepted in research and school laboratories all over the globe. In summarizing the status of the scientific designation Amoeba proteus of Leidy, we find (1) that it is invalid since it cannot be applied to one definitely described species, but to three, and (2) that it cannot be applied to the common laboratory ameba since the valid name for this species up to this time was Amoeba diffluens Mueller.

In 1926, Dr. Schaeffer, recognizing the structural similarity between Chaos chaos and Amoeba diffluens, took the latter species out of the top-heavy genus Amoeba and placed it in the genus Chaos together with Chaos chaos. Thus, the valid name of the species became Chaos diffluens Mueller.

Synonomy

1786 - Mueller - Proteus diffluens (Genus preoccupied)
1822 - Bory - Amiba muelleri (Invalid)
1838 - Ehrenberg - Amoeba princeps (Synonym)
1879 - Leidy - Amoeba princeps (Invalid)
1926 - Schaeffer - Chaos diffluens (Valid)

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Schaeffer, A. A. 1916 a Concerning the species Amoeba proteus Science, N. S., Vol. 44, pp. 468-469.

1916 b Notes on the specific and other characteristics of Amoeba proteus (Leidy), A. discoides Nov. sp., and A. dubia Nov. sp. Archiv. f. Protistenk. Vol. 37 pp.204-228

1926 Taxonomy of the Amebas. Carnegie Inst. of Wash.

Turtox News Sept, 1937)
Jan. 1938) Articles and pictures of general interest
March 1938) concerning Chaos chaos.
Nov. 1938)

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KNOW YOUR MUSEUM

The Heron

Of the twelve herons to be found in Maryland, three are on display in the Museum; namely, the Black-Crowned Night Heron, the Little or Eastern Green Heron, and the American Bittern.

The family of Herons and Bitterns are an unusual interesting group of birds and should be studied much more by bird lovers.

Herons are a gregarious group of birds often living in colonies. They are solitary as to feeding habitat, but return to roost in a kind of rookery.

On the other hand the Bitterns do not associate in flocks, one or at most, two, are found together. Bitterns generally feed in marshes where they build their nests or mounds of grass laying therein three to six eggs.

The Herons on the other hand, feed along the shores of lakes, rivers and bays. They build rather loosely constructed nests of small twigs high up in branches of trees, where they lay three to six pale blue or dull blue eggs. The food of Bitterns and Herons consists of frogs, fish, small reptiles, etc.

The writer had the occasion to study closely the Little Green Heron, over a period of weeks, and noted many interesting habits concerning this bird. When feeding, the bird stands motionless, and then suddenly it dips its long bill into the water and brings up a fish. The fish, when caught, was crosswise in its bill, whereupon the bird tossed it into the air, and caught it head first. This process kept up for a period of ten minutes.

Another nest containing five eggs was studied. Four hatched and were photographed. These four birds, though they had not learned to fly, could run from branch to branch over the tree tops with unusual agility. These young were fed by regurgitation.

The Herons and Bitterns are migratory arriving here in March, April and May, and leaving in September, October and sometimes as late as November.

To this group belong the Egrets, once so eagerly sought for their plumes. For a time they became quite rare and it was feared they would follow in the line of the Passenger Pigeon and some of our other birds and become extinct, but fortunately, our Federal Government and States have enacted laws for their protection and now they can be seen in numbers where one was fortunate to even observe a solitary bird.

***** E. B. F.

NOTES FROM FIELD AND LABORATORY

An Observation on the Vivacity of the Snapping Turtle (Chelydra serpentina)

June 16, 1939, while on a collecting trip to Gunpowder Falls, Baltimore County, I heard the crack of a pistol fifty feet below the Harford Road birdge that spans the river. When I investigated I discovered that a young Chelydra serpentina of seven inch shell

length had been killed while it had prowled on the shallow river bottom several feet from the south bank. The time was 3:35 P. M. Although the turtle's head had been pierced by a .22 caliber bullet, its body was still thrashing about. The boy who shot that turtle used it as a target to test his new target pistol. I left to do some collecting, but when I returned at 6:30 P. M. I discovered the body of the reptile simply dotted with bullet holes. When I touched a hind leg with a stick that member was promptly withdrawn to the safety of the bullet riddled shell; the tail when touched moved from one side to the other. I was not able to remain until all signs of "life" disappeared.

Elias Cohen.

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NOTES FOR THE MONTH OF AUGUST

Meetings and Lectures at the Society

August 1 - Talk by Mr. T. Milton Oler, Jr., "Making a Relief Map".
8 - Talk by Mr. Bruce Overington, "Experiences in the North Woods".
15 - Talk by Mr. Earl Palmer, "Ancient Man".
22 - Talk by Mr. Herbert C. Moore, "Natural History and the Law".
29 - Talk by Mr. Andrew Goss "The American Bison".

Junior Division

August 5 - Talk by Edwin Hurd, "Grasshoppers and Their Cousins".
Talk by Henry Eichhorn, "The Chaotic State of the Genus Chaos".
12 - Talk by Richard Myers, "Design for Life".
Talk by William Miller, "Reptile Eggs".
19 - Talk by Miss Mary Elliot, "Our Camping Trip".
Talk by Romeo Mansueti, "Salamanders and Lizards in and Around Baltimore".
26 - Talk by John Norman, "Crocodilians in General".
Talk by William Norman, "Care and Feeding of Tropical Fish".

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The Natural History Society of Maryland

BULLETIN

Volume X OCTOBER, 1939 Number 2

THE MAMMAL NEST BEETLES
(Coleoptera, Family Leptinidae)

By Herbert H. Moorefield

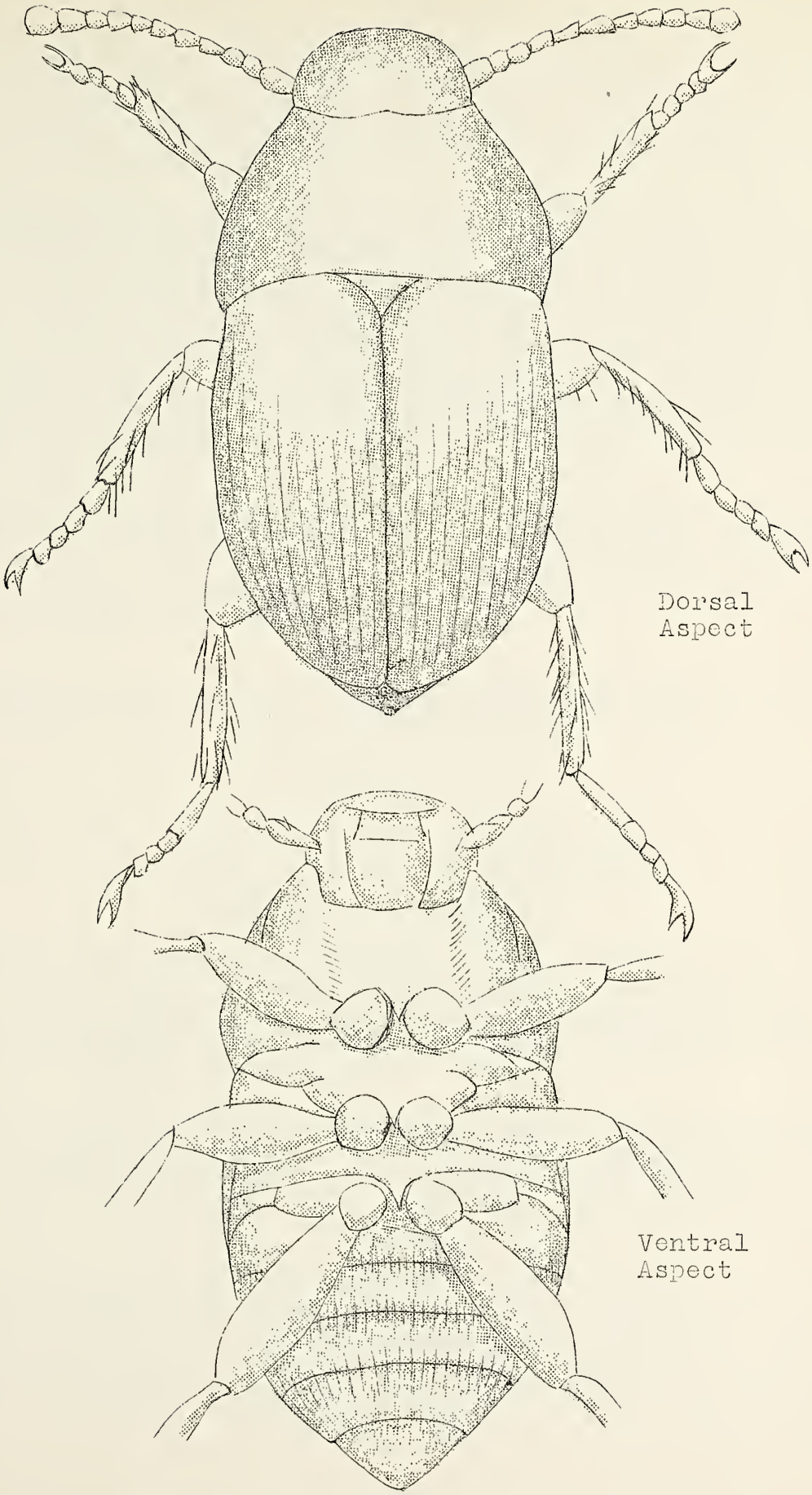
According to Leng, (1) there are three representatives of the Family Leptinidae found in North America. Leptinus testaceus Mull. is the most widespread of the three and has been definitely reported from New York, Pennsylvania, District of Columbia, North Carolina, Ohio, Indiana, and Iowa, and probably occurs over the entire United States. It is also reported from British Columbia and Europe. Leptinus validus (Horn) is confined to the Hudson Bay Territory and Leptinus aplodontiae Ferris has been found only in California.

The Leptinids are usually found in the nests of small rodents and insectivora such as mice, shrews, moles, etc., and also in the nests of bumble-bees. It is thought by some workers in the field of entomology (2) that the natural habitat of these small beetles was originally the nests of bumble-bees, where they fed on honey, and that they merely make use of other nests (mice, moles, etc.) as convenient stops in going from one nest to another.

In August, 1937, I collected a specimen of the common eastern mole, Scalopus aquaticus aquaticus (Linnaeus), in Druid Hill Park. Upon returning to the laboratory and inspecting the animal under a strong light for possible parasites, I found about twelve individuals of L. testaceus running about in the fur of the mole. Brimley (3) mentions the occurrence of this species on moles but makes no comments. It may be possible that they use the mammals themselves as a matter of conveyance from one place to another.

Whether the beetles are direct parasites or merely guests of the various hosts is still an undecided question.

1. Leng, Charles W. (1920) "Catalogue of the Coleoptera of America, North of Mexico".
2. Comstock, John H. (1925) "An Introduction to Entomology".
3. Brimley, C. S. (1930) "The Insects of North Carolina".



LEPTINUS TESTACEUS MULL.

Blatchley (4) states, "It is possible that they live upon the eggs and young of the mites, fleas, and other forms of life found associated with them in the nests." Charles Drury, of Cincinnati and W. S. Blatchley have both observed them in nests that had long since been deserted, a fact which adds further weight to the belief that they are merely guests.

Leptinus testaceus Mull. is a small, oblong-oval beetle, much depressed in form and measures from 2 mm. to 2.5 mm. in length. It is a uniform pale yellow in color, finely and regularly punctured above, and is rather thickly beset with golden pubescence. The eyes are entirely wanting and the antennae are slender and eleven-jointed. The base of the thorax overlaps the base of the elytra and is broadly emarginate. The beetle has a distinct scutellum. The elytra are rounded at the tip and cover the abdomen. Its legs are short, with flattened tibiae and the tarsi are five-jointed.

Specimens of L. testaceus are comparatively rare, but they can be best collected by removing the nest of a mouse, shrew, etc., from its shelter and shaking it over a piece of white paper. If the beetles are present, they will probably fall on the paper where they can be easily seen and captured.

4. Blatchley, W. S. (1910) "An Illustrated Catalogue of the Coleoptera or Beetles known to Occur in Indiana".

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TWO GORGETS FROM TIDEWATER MARYLAND

By Richard E. Stearns

Some five years past, the writer, while examining the aboriginal shell deposit bordering the Chester River at Love Point, made the acquaintance of James Marks, a resident of that section, who possessed a collection of Indian artifacts found on the shell fields in the vicinity.

During our day's search, the writer found three fragments of a large gorget, which fitted together and comprised about one-half of the complete specimen. The fragments were scattered about ten feet apart and were no doubt broken when the field was cultivated.

A few days ago Mr. Marks visited the Society and generously presented to us two more fragments of the same gorget which, when fitted to the other portion, completed the specimen. The gorget, which is made of a blue grey mottled shale, is shown full size in the illustration. It is very unusual to recover from a plowed field a complete object that has been broken into so many fragments.

A broken gorget of the same type and material was found on a shell field at Booby Bar, at the mouth of Middle River by Mr. Tauroza, a resident of that locality.

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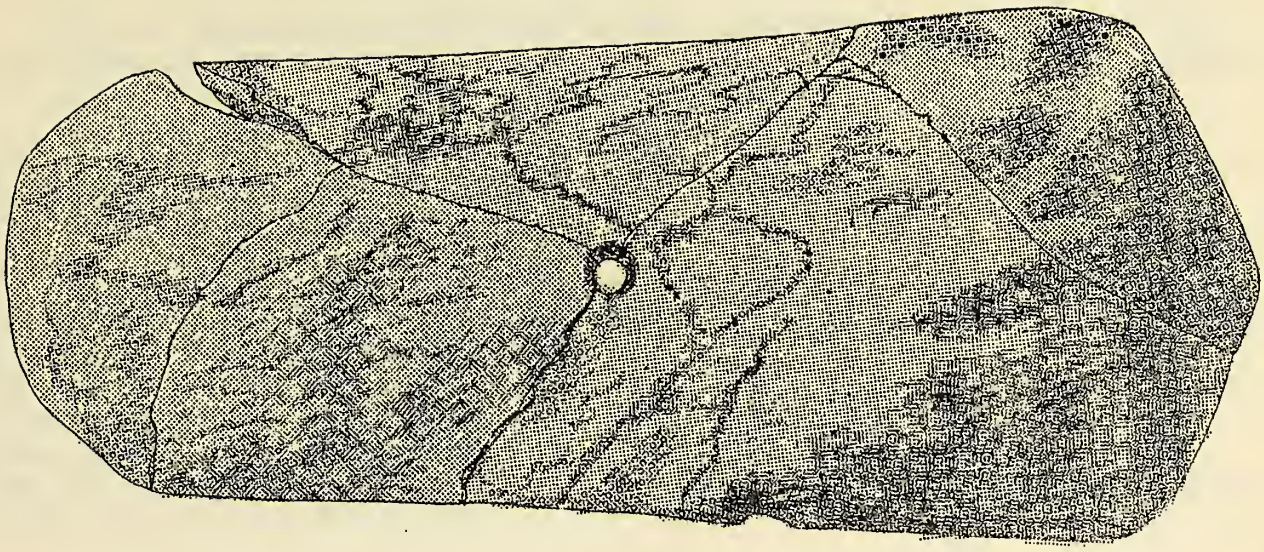
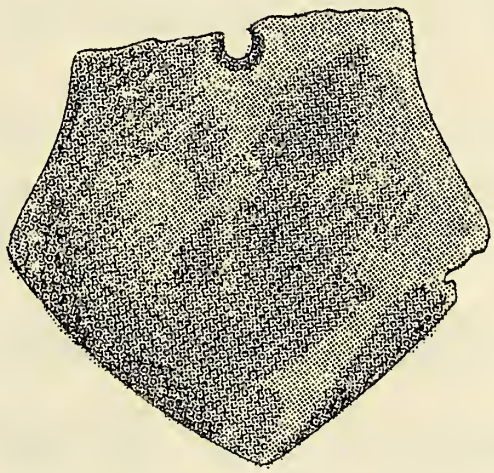
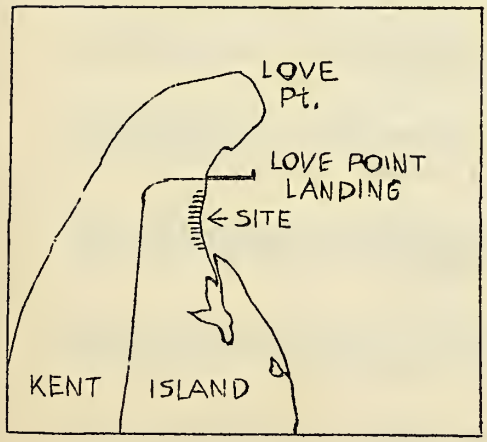
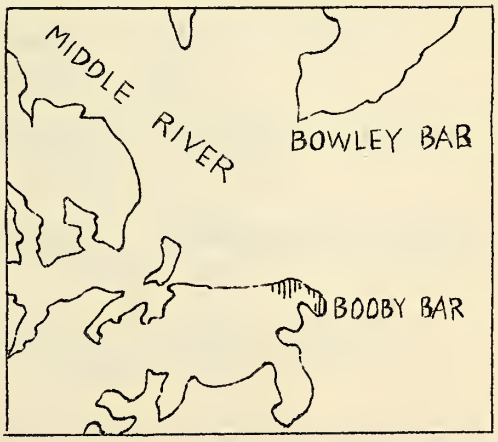


Gorget from Love Point, Md.

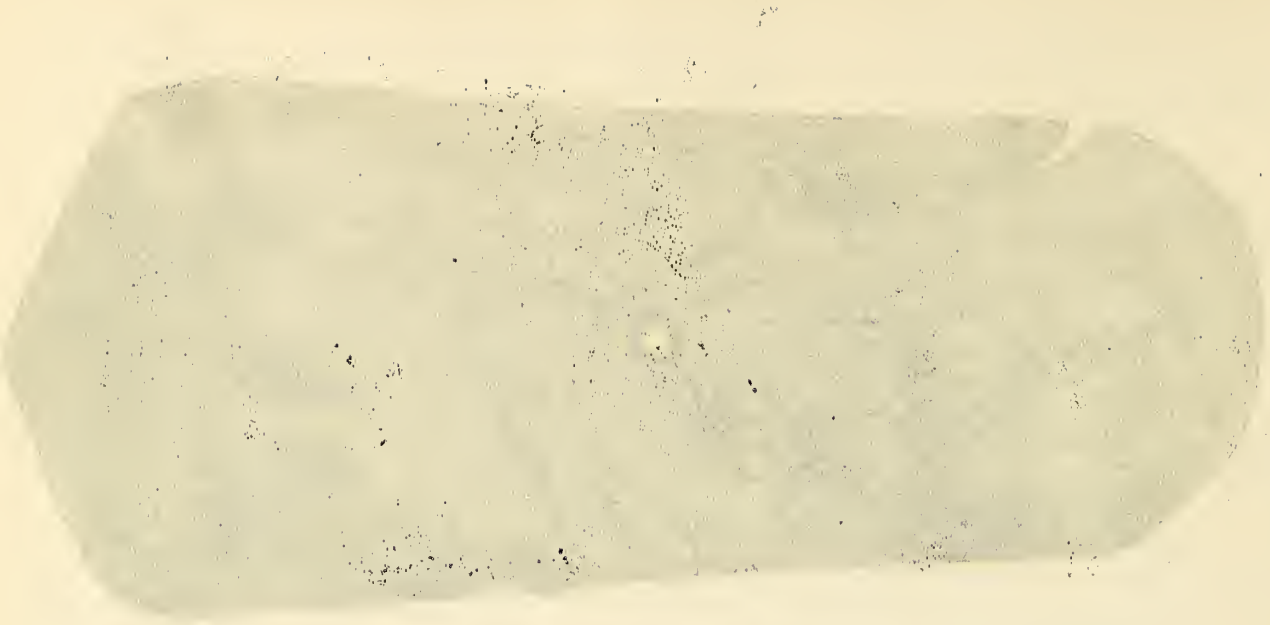


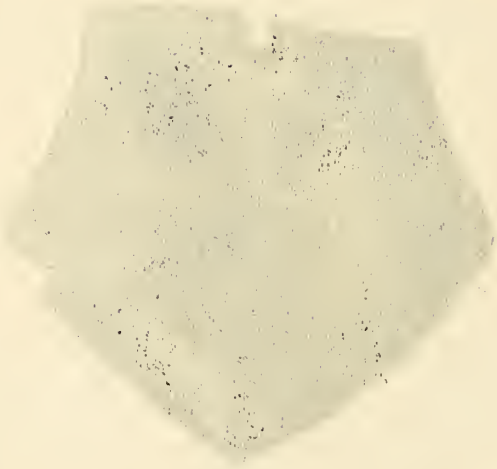
Gorget from Booby Bar, Md.





Maps of sites where gorgets were found.





SOME NOTES ON A RECENT TRIP TO DEWEY BEACH, DELAWARE

By Elra M. Palmer

Mr. A. Llewellyn Jones and I were fortunate enough to spend five days at Dewey Beach, Delaware, this past July. (25th to 29th)

We were particularly interested in the various forms of marine life and with the kind assistance of Captain P. Hugo Wise, of the Baltimore City College faculty and his family, our trip was indeed very successful.

The following is a list of specimens collected. We are indebted to Mr. Frank Yingling of the Society's Department of Marine Life, for his identification of the fish. At some later date various detailed reports will be published concerning some of these specimens, as well as those that have been collected along the ocean front area of Maryland on our various other trips. This work is being done with the cooperation of Mr. A. Llewellyn Jones and Mr. T. Milton Oler, Jr.

Fish:-

Fundulus heteroclitus, (mud minnow) 5 males, 5 females, 10 immature; seine and dip net; Delaware Bay, nr. Cape Henlopen. Rehoboth Bay at Dewey Beach, Del.

Fundulus majalis, (bull minnow) 2 males, 2 females, 4 immature; seine; Rehoboth Bay at Dewey Beach, Del.

Cyprinodon variegatus, (sheepshead minnow) 3 males, 5 females; seine (night); Rehoboth Bay at Dewey Beach, Del.

Lucania parva, (rain-water fish) 3 males, 1 female; dip net; Rehoboth Bay, Dewey Beach, Del.

Menticirrhus americanus, (whiting) 2 specimens; dip net; Del. Bay, near Cape Henlopen, Del.

Brevoortia tyrannus, (menhaden, alewife) 12 specimens; seine (night) Rehoboth Bay, Dewey Beach, Del.

Leiostomus xanthurus, (spot) 7 specimens; seine (night) Rehoboth Bay, Dewey Beach, Del.

Micropogon undulatus, (croaker, crocus) 10 immature; seine; Del. Bay, near Cape Henlopen, Del.

Paralichthys dentatus, (summer flounder) 3 specimens; seine (night), Rehoboth Bay, Dewey Beach, Del.

Menidia menidia, (silversides) peritoneum black; seine; Del. Bay, near Cape Henlopen, Del.

Menidia beryllina, (silversides) peritoneum silvery or dotted black; seine; Del. Bay, near Cape Henlopen, Del.

Anchoviella mitchilli (anchovy) 100 immature; seine; ocean surf; Dewey Beach, Delaware.

Mustelus mustelus, (sand shark, smooth dogfish) 3 immature, not more than 2 or 3 days old; surf fishing, Dewey Beach, Delaware.

Syngnathus fuscus, (common pipefish) 6 specimens; seine; Delaware Bay, near Cape Henlopen, Del.

Gambusia holbrooki, (top minnow) 2 specimens; seine; Rehoboth Bay, Dewey Beach, Delaware.

Cynoscion regalis, (weakfish, squeteague) 2 immature; dip net; Del. Bay, near Cape Henlopen, Del.

Crustaceans:-

Libinia emarginata, (spider crab) 3 females, 1 male, 1 carapace. Lobster pots, Delaware Breakwater, Del. Bay.

Ovalipes ocellatus ocellatus, (lady, sand or calico crab) surf casting; Dewey Beach, Del.

Ocypode albicans (sand or ghost crabs) 7 females, 8 males, on ocean beach, night, with flashlights; Dewey Beach, Delaware.

Pagurus longicarpus, (small or long armed hermit crab) 20 sp. Delaware Bay, near Cape Henlopen, Del.

Pagurus pollicaris, (large hermit crab) 3 specimens, Delaware Bay near Cape Henlopen, Del.

Pinnotheres maculatus, (mussel crab, commensal) 6 females, 3 males, in mussels (M. edulus); Del. Bay, near Lewis, Del.

Panopeus sp.?, (mud crab) 1 specimen.jetties; Delaware Bay, Cape Henlopen, Del.

Uca pugilator, (sand fiddler crab) 7 females, 34 males, mud flats, Delaware Bay, near end of Cape Henlopen, Del.

Uca pugnax, (marsh or mud fiddler) 2 females, 6 males. Small colony on S. E. side of bridge #702 near Indian River Inlet, Delaware.

Callinectes sapidus, (blue crab) 1 female, 1 male; seine, Rehoboth Bay, Dewey Beach, Delaware.

Palaemonetes vulgaris, (common prawn) 2 specimens; seine; Del. Bay, near Cape Henlopen, Del.

Hippa talpoida (sand bug) 20 specimens; in surf; Dewey Beach, Delaware.

Mollusca:- (living animals collected in their shells)

Modiolus demissus (plicatula), (ribbed mussel) 4 specimens Rehoboth Beach, attached to fucus. Delaware Bay, near Cape Henlopen, Del.

Mytilus edulus, (edible mussel) 12 specimens, Ocean surf; South of Cape Henlopen, Del.

Ostrea virginica, (common oyster) 3 sp. attached on submerged hull; Delaware Bay, Cape Henlopen, Del. (S. luciae, striped anemonea attached to oysters)

Crepidula fornicata, (boat shell) 12 specimens, Delaware Bay, Cape Henlopen, Del.

Crepidula plana, (flatboat shell) 6 specimens; found attached to oysters, horseshoe crabs and large hermit crabs. Del. Bay, Cape Henlopen, Del.

Natica duplicata (Polynices), 4 specimens, mud flats, Del. Bay, Cape Henlopen, Del.

Busycon (Fulgur) canaliculatum, (channeled whelk) 3 specimens; mud flats, Del. Bay, Cape Henlopen, Del. (one string of egg cases found on beach).

Nassa obsoleta, 43 specimens; covered sandbars and mud flats. These gastropods were devouring dead fish and feeding on soft crabs (Callinectes, Ovalipes) Delaware Bay, Cape Henlopen, Del. (Egg capsules of this animal were found on oysters, shells, stones and pilings).

Urosalpinx cinerus, (oyster drill) On submerged hull, Delaware Bay, Cape Henlopen, Del.

Mollusca:- (just the shells of these animals were found)

Busycon (Fulgur) carica, (knobbed whelk) 2 shells found, inhabited by long armed hermit crabs. Delaware Bay.

Natica clausa, (small moon shell) 1 shell on beach. Delaware Bay, Cape Henlopen, Del.

Littorina litorea, (edible periwinkle) one shell on marsh grass. Bridge #702, Rehoboth Bay, Del.

Pecten irradians, (common scallop) 7 shells on beach, Ocean front; Cape Henlopen, Del.

Pholas costata, (angel-wing shell) fragments on beach at ocean front. Dewey Beach, Delaware.

Anomia ephippium, (common jingle shell) 13 on ocean beach S. of Dewey Beach, Del.

Tagelus gibbus, (long clam) 4 shells on ocean beach, Cape Henlopen, Delaware.

Arca pexata, (bloody clam) 2 shells on ocean beach; Dewey Beach, Delaware.

*****

CONSERVATION IN MARYLAND MAKES RAPID PROGRESS

By Frank L. Bentz
Chief Clerk, State Game
and Inland Fish Commission

The progress made in Conservation in Maryland during the past four years ia almost unbelievable. Among the many good influences were the two successful Outdoor Life Shows. These two exhibitions, held in consecutive years, brought to the attention of thousands of Marylanders and visitors from every part of the country the many outdoor interests of our State and the need for their protection and advancement. These shows advertised Maryland as no other medium could.

Four years ago pollution in many streams and bay estuaries was an accepted evil. Now due to a rigid enforcement of our pollution laws, many of our abandoned waters have been brought back to full use again as additional placesto fish. Many valuable shore properties that were untenantable because of industrial pollution, are once again made valuable real estate.

"An Aquarium for Baltimore" was the dream of a few, so when the opportunity presented itself and help came from many sources, this dream became a reality. Dr. Howard Kelly describes the aquarium as "Not near as large as others, but most complete in every detail - a little gem". Thousands of persons have visited the Aquarium. It has been of valuable assistance to the school children, special showings being arranged after school hours. From Mr. and Mrs. Aaron Strauss the Aquarium has had wonderful assistance, which enabled a display of many unusual fishes.

Fishing in our fresh water streams has come back much faster that has been expected. Due to a better understanding of the propagation of trout and bass and the new plan of stocking, fishing has been made more uniform during the respective seasons. In 1935 19,445 licenses were issued to anglers. In 1939 they increased to 30,000.

Bay fishing has shown a wonderful come-back. Rock fishing will show an increase this year of about half a million pounds. This does not include fish taken by hook and line. It is our opinion that this come-back is due to the elimination of the purse net and the outlawing of the run-around gill net.

Conservation to the writer is a better understanding of the many problems presented and the practicing of the right uses by ourselves as we go astream or afield.

The enforcement of the laws is, and always will be, necessary,

but the Conservation-mindedness of the people will be the means of making this big problem an easier one and also make the life of the Game Warden more liveable.

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NOTES ON A HORNED GREBE

By John M. Gross

On Sunday, April 23, 1939, I saw what appeared to be a duck in the stream which, in its course to Loch Raven, runs under the end of Seminary Avenue, but later I identified it as a Horned Grebe (Colymbus auritus). It seemed odd that the bird did not fly awat. My closer approach caused it to dive and swim upstream until it was hidden by the snow-white water of a swift cascade. Unable to pass this barrier, it suddenly popped to the surface.

I had but little trouble to catch the Grebe after cornering it, by wading in from downstream.

At first the Grebe tried to peck me, but though its beak was pointed, its neck was too thin to possess much striking power. The beak was about nine-tenths of an inch long, and was black with a white tip. When captured, the bird called like an angry crow; that was the only sound it made.

The feet were different from any type I had ever seen. Of the four toes, the three front ones had lobes almost half an inch wide, and each toe was folded over the other, offering less resistance to the water when brought forward for another stroke. The hind toe was reduced in size, and was slightly lobed. A duck's feet are different in that they are fully webbed (except the hind toe). Grebes have webs extending one-third of the toe length.

The Grebe was in adult summer plumage, and was on its northward migration. The feathers on its body were rather downy and so dense that it would have been impossible to part them to see the bird's skin. Its belly was white; and the throat, breast, sides, and flanks were chestnut. The back was a dark gray, or almost black and the crown had long, very black plumes. On my specimen there were buffy cream colored plumes behind the eyes. The auriculars were also composed of long, very black plumes. These contrasting colors of the two-inch long plumes gave the Grebe a very striking appearance..

As for eyes they were the brightest Cardinal Red I have ever seen, with black pupils edged with white.

After writing down all I thought of significance, I lifted the bird as high as I could and let it drop. To my surprise, it merely flew about ten feet, even though it made quite an effort with its rather short wings. When I walked toward it, it attempted to scamper away by using feet and wings, using the wings as though they were a second pair of legs. However, it was unable to make much progress among the dead weed stalks.

I had decided to take the bird home for further observation

since it appeared not to be able to take very good care of itself, but when I trustingly set it down in a pasture with the rest of my burden the Grebe dashed off. Another stream happened to be nearby, and I lost the race, and this time because of the deeper water and overhanging banks I was unable to recapture it.

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NOTES FROM FIELD AND LABORATORY

Loch Raven Deer

In the Bulletin for September, 1938, I reported, among other mammals seen about Loch Raven, a single deer observed on the west side of the lake during May, 1938. Subsequently, I learned that deer had been noted by others in the region. It was supposed that a few had drifted down along the wooded valley of the Gunpowder from the upper part of Baltimore County. A gentleman farmer imported and released a buck in the general region also. On June 15, 1939, I observed two deer near the spot where I had seen the one in 1938. One was a doe and the other was a buck with horns in velvet and probably not yet fully developed. On August 28, 1939, again in the same locality, I saw a doe, a buck, and a half-grown young one crossing a road. A fuller account of these deer and their activities will appear in a later supplementary article on Loch Raven Mammals.

C. Haven Kolb

WEASEL

On October 7, 1939, the writer chanced on a dead weasel (Mustela frenata noveboracensis) lying near the edge of a woods at Loch Raven, Maryland. The skin of the right front leg had been torn away at the shoulder, exposing the muscles underneath. This specimen was found at 7 O'clock in the morning, and was apparently not dead more than a few hours at the most.

This find increases Kolb's list of mammals in the Loch Raven area to thirteen. (See Bull. N. H. S. Md., IX, No. 1)

***** Henri Seibert

LIBRARY NOTES

Several notable gifts have come to the Society's library recently:

From the Bureau of Biological Survey was received a nearly complete file of the mimeographed Wildlife Research and Management Leaflets. This is particularly valuable to students of mammalogy.

From Mr. John B. Egerton, a large number of valuable magazines. Besides a long series of the Scientific Monthly, previously represented in our library only by a few scattered copies, this gift contains some complete early volumes of the National Geographic, extending our series back to 1911.

From Mr. Irving E. Hampe, a long series of the Nature Magazine

and a complete file of Popular Photography to date. Photography being so essential to good natural history work, it is hoped that some member may be able to continue, issue by issue, the series of this periodical so valuable to beginner and advanced worker alike.

*****

KNOW YOUR MUSEUM

Moths

It is not unusual for the average person to call a moth a butterfly and most persons' conception of a moth is the clothes moth so often found in the home.

Many times species of our large moths have been brought to the writer as strange butterflies. This is natural, especially to the average city dweller who very rarely encounters our larger moths. This can be well understood as moths are usually nocturnal or night fliers, whereas butterflies all fly during the day. Aside from this there are some other differences, such as the antennae which are feathered or thread like in the moth and knobbed or thickened at the end in the butterfly.

The body of the moth is large and soft, that of the butterfly is slim and more or less hard.

There are many more species of moths than butterflies. Most of these are small, but Maryland is fortunate in having quite a number of large and beautiful species.

Because of limited space in the Museum there are only displayed a very few of the vast host of moths, but most of the larger ones are included in the exhibit.

To acquaint the public with the large and more spectacular Maryland moths the Society has published a leaflet. "Familiar Moths of Maryland."

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NOTES FOR THE MONTH OF SEPTEMBER

Meetings and Lectures at the Society

Sept. 5 - Talk by Mr. Joseph White, "A Comparison of the Fish of the Catoctin Area and the Cypress Swamp".
12 - Talk by Mr. Price G. Piquett, "The Pine Blister Rust".
19 - Talk by Mr. John B. Calder, "Importance of Paleontology and Its Possible Future".
26 - Talk by Mr. Irving E. Hampe, "Maryland Bats".

Junior Division

Sept. 3 - Talk by Joseph Bures, "Lithography in Relation to Nat.Hist."
9 - Talk by Harold Levy, "Salt".
16 - Talk by Henry Eichhorn, "Protozoa".
30 - Talk by William Moorefield, "Nerthridae or Toad Bugs of M

Lectures, Exhibitions and School Loans

Sept. 23 - Woodbine School, Loan of Insects.
26 - Enoch Pratt Free Library, Branch #11, Loan of Plaster Casts of Leaves and Wood Sections.

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The Natural History *Society of Maryland*

BULLETIN

VOLUME X NOVEMBER, 1939 NUMBER 3

THE IMPORTANCE OF THE NATURAL HISTORY MUSEUM TO THE COMMUNITY

By Edmund B. Fladung

Until a comparatively recent date museums were only repositories for collections and specimens of Natural History and did not conduct the additional educational activities of the progressive museums of the present day. These older museums were connected with a scientific society or belonged to the State or Government.

They were under the care of a curator, who was a scholarly person and whose chief duty was the keeping of the collections in good condition and order. He added to these collections what he was able to secure, either by his own efforts or what was presented to the museum from other sources. The smaller specimens were generally kept in cabinets made for this purpose; the larger specimens in glass cases.

Rarely did persons have access to those collections except those who were in direct contact with such institutions, and any others had to obtain special permission or present certain credentials to look over or use them.

Later on, many of the specimens were placed on display for the benefit of the public at certain limited times, but the service of the museums did not extend much beyond this for many years.

These institutions were supported mainly through private endowments or by the State.

To-day this has entirely changed. The museum, especially the Natural History Museum, has assumed an entirely different role. It is now on a par with the public library and performs in its special field a similar function.

The age in which we live has brought about this change in the functions of the Natural History Museum, - a change caused by many factors. Notable ones have been the teaching of Nature in the curricula of our schools, the participation of our youth in

the great outdoor movements, the needs of industry for information relative to our natural resources, the great necessity for the conservation of our wild life, and the opportunity for employment of leisure time for our youth.

The museum of to-day is a necessary adjunct to the cultural life of a community. The modern museum presents the same busy place as one finds in a library. Here one sees people going about the exhibits, some from mere amusement, others to make notes for school requirements, and others to seek information for various uses. Classes of children, accompanied by their teachers are seen, listening to instruction by a docent employed for this purpose. In many communities these lessons are part of a day's lesson, and in some higher schools, credits are awarded for certain work done within the museum building.

Boy and Girl Scouts, Camp Fire Girls and other nature groups will be seen studying various displays for merit badge work.

Inquiries are received at the museum by telephone, mail, and in person, relative to all sorts of things. Some persons want information concerning insects affecting various plant life about the home and garden. Other inquiries from commercial concerns pertain to mineral and rock deposits. Others again are related to the location of fish and game about the State; also many inquiries as to reptiles, birds, mammals and plants, are received. Even information about taxidermy and the preservation of animals is requested. Often questions are asked about domestic animals, their food, health, and care.

In very large museums a department is maintained where teachers can select lantern slides, pictures, and specimens to be used in school class work.

Nearly every museum renders some sort of educational service. This service varies according to the size of the Museum, but the extent of this service is gauged by the amount of funds available. In such cases where the museum received no funds from City or State, these services may be only a display of Natural History specimens for the benefit of the public. Under such circumstances this is all that can be expected. However, when funds are provided from City, State or private endowments these services are numerous, consisting of school loans of specimens and other demonstrative materials, guides, docents, publications, classes, information bureaus, and many other services besides the regular museum displays.

When one thinks of these services and that they are in the reach of every man, woman and child of a community, it is reasonable to expect that the cost of such services should justly be borne by the community receiving the benefits. Such is the case of the public library, and rightly so. Such should be the case of the public museum.

In this United States there are about a hundred museums devoted in part or wholly to Natural History. If the Natural History collections in universities and colleges were taken into account no doubt there would be many more. These have not been considered as the displays or museums are in most cases only for the

	Name of ing ship	City or Sta Appropriati
1	The Natural Hist	2,000.00
2	The Maryland Acate	1,500.00
3	Carnegie Museum tute	37,500.00
4	Boston Society c	
5	Children's Museu	
6	Buffalo Museum c	166,975.00
7	Milwaukee Public	324,675.00
8	California Acadcte	
9	Newark Museum te	150,000.00
10	Cincinnati Societe	
11	Minneapolis Publ	5,000.00
12	Louisiana State	24,500.00
13	Park Museum	18,500.00
14	Rochester Museum	70,000.00
15	Oakland Public M	8,346.11
16	Ohio State Museu	111,728.40
17	City Free Museum	City Approp
18	Houston Museum o	4,000.00
19	Colorado Museum te	56,000.00
20	Birmingham Publi	8,100.00
21	St. Paul Institute	5,000.00
22	Scientific Socied	
23	Witte Memorial Mu	18,000.00
24	The Museum of Nat Industrial Arts	22,000.00
25	Children's Museum	5,657.32
26	Dayton Public Lib	8,000.00
27	Worcester Naturalte	
28	Virginia State Mu	1,920.00
29	Museum of Natural	72,199.44
30	Kent Scientific M	38,500.00
31	Paterson Museum	8,000.00
32	Bridgeport Scientte Society	
33	O'Rourke Zoologicte	
34	San Diego Society	(16,598.99
35	Tennessee State M	(1,560.00 Funds from St
36	Yonkers Museum of	10,030.00
37	Crichlow Museum cte	
38	New York State Mu	76,900.00
39	New Jersey State	57,205.00
40	Reading Public Mu	2,500.00

* Denotes Institut such as Library, ing.

	Name of Organization	City	State	Population of City	Building Ownership	City or State Appropriation	Type of Exhibition	Last Annual Attendance
1	The Natural History Society of Maryland	Baltimore	Maryland	822,340	City	2,000.00	Nature	82,418
2	The Maryland Academy of Sciences	Baltimore	Maryland	822,340	Private	1,500.00	Mixed	
3	Carnegie Museum	*Pittsburgh	Pennsylvania	818,512	Institute	37,500.00	Mixed	No Record
4	Boston Society of Natural History	Boston	Massachusetts	787,271	City		Nature	36,000
5	Children's Museum of Boston	Boston	Massachusetts	787,271	City		Nature	151,196
6	Buffalo Museum of Science	Buffalo	New York	676,954	City	166,975.00	Nature	421,143
7	Milwaukee Public Museum	Milwaukee	Wisconsin	552,733	City	324,675.00	Mixed	1,000,000
8	California Academy of Science	San Francisco	California	645,416	Private		Nature	931,112
9	Newark Museum	Newark	New Jersey	565,413	Private	150,000.00	Mixed	199,363
10	Cincinnati Society of Natural History	Cincinnati	Ohio	549,354	Private		Nature	8,000
11	Minneapolis Public Library Museum	*Minneapolis	Minnesota	475,925	City	5,000.00	Nature	
12	Louisiana State Museum	New Orleans	Louisiana	455,792	State	24,500.00	Mixed	166,000
13	Park Museum	Providence	Rhode Island	349,380	City	18,500.00	Nature	
14	Rochester Museum of Arts & Sciences	Rochester	New York	325,869	City	70,000.00	Mixed	127,105
15	Oakland Public Museum	Oakland	California	307,100	City	8,346.11	Mixed	
16	Ohio State Museum	Columbus	Ohio	305,782	State	111,728.40	Mixed	330,000
17	City Free Museum	*Portland	Oregon	304,059	City	City Appropriation	Nature	
18	Houston Museum of Natural History	Houston	Texas	302,051	City	4,000.00	Mixed	250,000
19	Colorado Museum of Natural History	Denver	Colorado	295,623	Private	56,000.00	Nature	222,525
20	Birmingham Public Library Museum	*Birmingham	Alabama	285,016	City	8,100.00	Mixed	115,000
21	St. Paul Institute	St. Paul	Minnesota	275,881	Private	5,000.00	Nature	26,101
22	Scientific Society of San Antonio	*San Antonio	Texas	254,562	Rented		Nature	
23	Witte Memorial Museum	San Antonio	Texas	254,562	City	18,000.00	Mixed	110,000
24	The Museum of Natural History and Industrial Arts	Memphis	Tennessee	254,440	City	22,000.00	Mixed	52,000
25	Children's Museum of Hartford	Hartford	Connecticut	212,676	City	5,657.32	Nature	49,924
26	Dayton Public Library Museum	*Dayton	Ohio	206,692	City	8,000.00	Nature	25,642
27	Worcester Natural History Society	Worcester	Massachusetts	198,337	Private		Nature	6,726
28	Virginia State Museum	*Richmond	Virginia	182,883	State	1,920.00	Mixed	
29	Museum of Natural History	Springfield	Massachusetts	173,151	City	72,199.44	Nature	30,000
30	Kent Scientific Museum	Grand Rapids	Michigan	172,654	City	38,500.00	Nature	
31	Paterson Museum	*Paterson	New Jersey	171,196	City	8,000.00	Nature	14,000
32	Bridgeport Scientific and Historical Society	Bridgeport	Connecticut	166,804	Private		Mixed	3,269
33	O'Rourke Zoological Institute	San Diego	California	158,342	Private		Nature	
34	San Diego Society of Natural History	San Diego	California	158,342	City	(16,598.99 Co.	Nature	365,000
35	Tennessee State Museum	Nashville	Tennessee	153,153	City	(1,560.00 C	Mixed	
						Funds from State		
36	Yonkers Museum of Science and Art	Yonkers	New York	149,506	City	10,030.00	Mixed	18,094
37	Crichlow Museum of Natural History	Miami	Florida	135,761	Private		Nature	68,500
38	New York State Museum	*Albany	New York	128,846	City	76,900.00	Mixed	200,000
39	New Jersey State Museum	Trenton	New Jersey	122,610	City	57,205.00	Mixed	138,649
40	Reading Public Museum and Art Gallery	Reading	Pennsylvania	118,211	City	2,500.00	Mixed	200,000

* Denotes Institution occupies portion of building with other agencies such as Library, Art Gallery, etc. All others occupy entire building.

Name of Organizat

41 Erie Public Museum
42 Society of Natural His
43 Knoxville Academy of S
44 Portland Society of Na
45 The Children's Museum

46 The Baker-Hunt Foundat
47 The Academy of Science
Museum
48 The Charleston Museum
49 Holyoke Museum of Natu
and Art
50 Davenport Public Museu

51 The Berkshire Museum
52 Fond du Lac Public Mus
53 Battle Creek Public Sc
of Natural History
54 Peabody Museum of Sale
55 Herman Museum of Natur

56 Oshkosh Public Museum
57 The New London Public
58 North Carolina State M
59 Audubon Museum
60 Santa Barbara Museum o

61 The Bruce Museum
62 Cape Ann Scientific Li
Historical Association
63 Framingham Historical
History Society
64 Regar Memorial Museum
65 Buckingham Memorial Li

66 Klahhane Museum
67 Fairbanks Museum of Na
68 Vermont State Museum
69 Pacific Grove Museum
70 N. Arizona Society of

71 Nantucket Maria Mitche
72 Pember Library & Museu
73 Fairhope Public Librar
74 Cranbook Institute of
75 Letchworth Park Museum
76 Highland Museum of Natu

* Denotes Institution occu
such as Library, Art Gal

	Name of Organization	City	State	Population of City	Building Ownership	City or State Appropriation	Type of Exhibition	Last Annual Attendance
41	Erie Public Museum	*Erie	Pennsylvania	115,992	City	3,051.35	Nature	55,495
42	Society of Natural History of Delaware	Wilmington	Delaware	107,955	City		Nature	
43	Knoxville Academy of Sciences	Knoxville	Tennessee	106,307	Private		Nature	
44	Portland Society of Natural History	Portland	Maine	80,671	Private		Nature	
45	The Children's Museum	*St. Joseph	Missouri	80,944	Private		Nature	3,699
46	The Baker-Hunt Foundation Museum	Covington	Kentucky	79,453	Private		Nature	5,613
47	The Academy of Science and Letters Museum	Sioux City	Iowa	79,212	Private		Mixed	
48	The Charleston Museum	Charleston	South Carolina	63,148	Private	5,000.00	Mixed	64,937
49	Holyoke Museum of Natural History and Art	*Holyoke	Massachusetts	62,166	City	2,000.00	Mixed	34,453
50	Davenport Public Museum	Davenport	Iowa	60,728	Private		Nature	20,128
51	The Berkshire Museum	*Pittsfield	Massachusetts	49,675	City		Mixed	
52	Fond du Lac Public Museum	*Fond du Lac	Wisconsin	48,805	City	1,000.00	Mixed	
53	Battle Creek Public School Museum of Natural History	Battle Creek	Michigan	43,301	City	App.Board of Ed.	Nature	5,000
54	Peabody Museum of Salem	Salem	Massachusetts	43,287	Private		Nature	5[illegible],769
55	Herman Museum of Natural History	*Dubuque	Iowa	41,678	Private		Nature	
56	Oshkosh Public Museum	Oshkosh	Wisconsin	40,075	Private	7,000.00	Mixed	40,000
57	The New London Public Museum	*New London	Wisconsin	4,661	City	1,370.00	Mixed	
58	North Carolina State Museum	Raleigh	North Carolina	37,5[illegible]	State	10,440.00	Nature	206,301
59	Audubon Museum	Elgin	Illinois	35,912	Private	1,000.00	Nature	25,000
60	Santa Barbara Museum of Natural History	Santa Barbara	California	33,544	Private		Nature	25,000
61	The Bruce Museum	Greenwich	Connecticut	32,159	Private	City Appr.	Mixed	8,000
62	Cape Ann Scientific Literary and Historical Association	Gloucester	Massachusetts	30,836	Private		Mixed	124
63	Framingham Historical & Natural History Society	Framingham	Massachusetts	25,719	Private		Mixed	
64	Regar Memorial Museum of Natural History	Anniston	Alabama	23,546	City	1,500.00	Nature	
65	Buckingham Memorial Library Exhibits	*Faribault	Minnesota	12,766	City		Nature	
66	Klahhane Museum	Fort Angeles	Washington	10,053	Private		Nature	
67	Fairbanks Museum of Natural Science	St. Johnsbury	Vermont	7,884	Private	1,500.00	Nature	34,055
68	Vermont State Museum	*Montpelier	Vermont	7,643	State	500.00	Nature	
69	Pacific Grove Museum	Pacific Grove	California	5,554	City	900.00	Mixed	3,962
70	N. Arizona Society of Science & Art	*Flagstaff	Arizona	3,891	Private		Mixed	4,065
71	Nantucket Maria Mitchell Association	Nantucket	Massachusetts	3,678	Private		Nature	
72	Pember Library & Museum	*Granville	New York	3,483	Private	City Appr.	Nature	
73	Fairhope Public Library	*Fairhope	Alabama	1,529	City		Mixed	
74	Cranbook Institute of Science	Bloomfield Hills	Michigan	1,127	Private		Nature	
75	Letchworth Park Museum	Castile	New York	900	City	900.00	Nature	35,000
76	Highland Museum of Natural History	Highland	North Carolina	443	City		Nature	629

* Denotes Institution occupies portion of building with other agencies such as Library, Art Gallery, etc.. All others occupy entire buildings.

benefit of the students of their institutions and not for the public at large. There are also some private museums which have not been considered.

In making a survey of Natural History museums only those cities having museums whose population is smaller than Baltimore have been considered.

The population of the various cities and other statistics used here were secured from various sources. A large percentage of dats was taken from the latest "Handbook of American Museums", published by the American Association of Museums in 1932. Some was taken from the recent reports of the larger institutions. The list hereto appended will give a good idea of what is being done by Cities and States towards the support and maintenance of Natural History museums. This list also shows how well these institutions are patronized by the public.

Of our 48 States, 32 have Museums wholly or partly devoted to Natural History. Within these 32 States there are 76 museums in cities smaller than the City of Baltimore, 46 of which are entirely devoted to nature and the other 30 partly to nature. Of these 30 some contain nature, art and history exhibits, and a few, nature and industry. One can see that 60% of the museums specialize in nature only, but that all include it in their educational set-up.

Most of these Institutions are housed in an entire building for this purpose. A few are located in a part of a public library or other agency, and several have rented quarters. The following are the actual statistics: occupying an entire building for this purpose - 55, with other institutions in the same building - 19, rented quarters - 2.

The greater number of these buildings are owned by City or State. Of these 76 museums, 37 are owned by a City, 5 by States, and 34 belong to the Institutions themselves.

If the museums were not a factor in our educational system, they would not serve any purpose. But as mentioned before all museums perform some useful educational function for the public. Of these functions school service is the most important. This is chiefly gauged by the amount appropriated from City or State for this purpose. Where the City fails to provide funds, usually there is no school service, and in the few such cases where school service is offered it is by heavily endowed museums and some of these are very limited. Only 2% of the Museums that fail to receive City or State aid give any museum service. This 2% is represented by only 5 museums, 4 of which are endowed; the other charges admission, enabling it to render a meager service.

From this report one can see that it is necessary for a museum to receive financial support from either the City or State, unless it is heavily endowed, if it is to perform the functions expected of it from the community.

Within the past ten years the Natural History Society of Maryland has been gradually building up every function that would be expected of a modern museum of Natural History. Aside from its

museum, the Society operates an annual Summer School for the children of the City. It maintains a loan service of specimens and Natural History objects for use in class room work. It gives lectures, talks and demonstrations to schools and other organizations. It publishes leaflets on the more popular forms of nature. It maintains and operates a division for boys and girls interested in nature, and also a Boy Scout troop. It publishes a semi-scientific Bulletin on Maryland nature and scientific proceedings.

It has made a study collection of nearly all branches of Natural History. It participates by exhibits or otherwise, in every movement in which nature plays a part. It contributes, helps, and fosters all movements for the conservation of wild life.

These things the Society has done and is doing to aid in the education of the citizens of Baltimore, and all this is accomplished by the members who receive no financial remuneration. These operations are carried on by the dues and contributions of the Society's members and friends, and a small appropriation from the City of Baltimore.

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ORNITHOLOGICAL OLSERVATIONS AT OCEAN CITY

By C. Haven Kolb

Ornithological knowledge in Maryland has a unique distribution. One part of the state, the area about Washington, has been as thoroughly worked as any section in the nation, while other parts are almost entirely unknown. The Department of Ornithology of this Society, after several years of effort, has been able to pick out these "blind spots" of Maryland bird-lore and make plans for their illumination during the coming years. Accordingly, when it became evident that an expedition could be arranged for the summer of 1939, there was no debate concerning the locality to be explored. The oceanfront county of Worcester was the inevitable choice and Ocean City was decided upon as the most convenient point for headquarters.

Through the agency of Mr. Frederick Saffran we secured a letter of introduction to Mr. Dan Trimper III from Mr. Frank Bentz of the Conservation Department. This was of great value to us since we were unacquainted with Ocean City and its environs. By consulting with Mr. Trimper we were quickly able to get settled and begin work, an important consideration when there is but a brief time to survey territory which is entirely new to the observers.

The expedition, consisting of Mr. August Selckmann and the writer, was in the field from August 1st to August 7th. However, work was not begun until the morning of the second. Our tent was placed upon a sandbar on the mainland side of Sinepuxent Bay. By automobile we could get quickly to Ocean City and to the beach, north of it. By rowboat we could explore the shores of the bay and also gain access to the long, deserted beach south of the Ocean City inlet. Close behind us was a wide salt marsh with winding channels and a broad, shallow lagoon which became a fine mudflat at low tide.

Although we were prepared to trap mammals as well as collect birds it soon became evident that we would more than have our hands full with the latter. We were forced to dismiss from our minds such interesting things as mammals, fish, crabs, molluscs, insects and the peculiar salt marsh flora, and even land birds, to some extent, in order to concentrate on the many species of water birds, several of which were new to us. Consequently the findings of the expedition can best be shown by a carefully annotated list of bird species observed.

1. Ardea herodias herodias - Great Blue Heron. The marshes, extending for miles, form an ideal feeding place for members of the heron family. This large species, however, was not common.

2. Florida caerulea caerulea - Little Blue Heron. Early in the morning of August 3rd we saw an adult and two immature birds of this species flying over the marshes together. No others were noted during our stay.

3. Butorides virescens virescens - Eastern Green Heron. This species was a common denizen of the marshes. It was usually to be found standing along the drainage ditches or beside the narrow winding channels. In such situations it was very inconspicuous and was usually flushed before being noted.

4. Anas rubripes tristis - Common Black Duck. Two Black Ducks were seen flying over the marshes on the morning of August 3rd. They were the only ones noted during our stay.

5. Cathartes aura septentrionalis - Turkey Vulture. Few indeed were the times when Turkey Vultures were not to be seen in the sky over the mainland near Ocean City. However, they seldom seemed to be near the outer beaches where the gulls probably usurped their sanitational functions. We were constantly on the lookout for the Black Vulture (Coragyps atratus) but did not succeed in finding any.

6. Haliaeetus leucocephalus leucocephalus - Southern Bald Eagle. Only one adult of this species was observed. It was seen on August 3rd near the inlet.

7. Circus hudsonius - Marsh Hawk. These birds were seen several times in the marshes. A large brown female was seen on the morning of August 3rd perched on a heap of peat in the middle of the marsh.

8. Pandion haliaetus carolinensis - Osprey. This was, naturally enough, an omnipresent bird over the bay. Not far from our camp there was a group of dead trees standing on a slight rise of ground in the center of the marsh. There were two nests in these dead trees but the young had left and were fending for themselves. However, the trees were favorite perching places and one or more birds could almost always be seen in the vicinity of them.

9. Colinus virginianus virginianus - Bob-white. This was not a bird of the habitats which we were especially exploring, but calls of the species were heard a number of times coming from the mainland farms west of the marshes.

10. Rallus longirostris crepitans - Northern Clapper Rail. The presence of rails is very difficult to detect. They must have been fairly common. Several times in the early morning they were heard to give their rather loud and throaty kuk-kuk-kuk calls repeated in varying rhythms for some time. They were flushed a number of times when we waded through the marsh at low tide. It was always startling to see such a large bird disappear completely in the short marsh grass. Mr. Selckmann reported seeing them running along the drainage ditches at low tide.

11. Charadrius semipalmatus - Semipalmated Plover. These little plover were one of the common birds of the mudflats, where they ran about with the "peeps" in search of food. They seemed to avoid sandy beaches while feeding. One specimen was secured on August 3rd.

12. Oxyechus vociferus vociferus - Killdeer. Killdeer were also characteristic of the mudflats although they were not seen so frequently as their smaller relatives.

13. Arenaria interpres morinella - Ruddy Turnstone. True to their generic name these birds confined themselves to sandy places. They were never seen on the mudflats of the mainland side of the bay. Their characteristic habitat was the ocean beach, although they were occasionally seen on the bay side of the barrier sand island. Although noted on several days, they were not common, only a few being seen at a time. One specimen was taken on August 3rd.

14. Phaeopus hudsonicus - Hudsonian Curlew. Several small flocks of these birds were seen, all flying rather high, southward, and following the inner edge of the bay. They were quite easy to identify, since even at a distance their large size and long decurved bills were very prominent.

15. Actitis macularia - Spotted Sandpiper. This shorebird was not common at Ocean City during our stay. It was never seen in flocks as were most of its relatives. Occasionally an individual was seen, usually along the winding channels which led into the marshes.

16. Catoptrophorus semipalmatus semipalmatus - Eastern Willet. Small flocks of these birds were observed in flight along the inner margin of the bay on August 2nd and August 4th. The flashing white and dark wings present a mark so arresting that no one could allow these birds to go by unnoticed.

17. Pisobia minutilla - Least Sandpiper. This species and the Semipalmated Sandpiper comprised the great bulk of the group of shorebirds which fed daily on the mudflats. Which species was in the majority it would be difficult to say. Both small sandpipers were sometimes seen on the sandy shores of the bay as well as on the mudflats. One specimen was secured on August 4th.

18. Limnodromus griseus griseus - Eastern Dowitcher. Something less than a dozen Dowitchers were daily feeders on the mudflats with the "peeps" and plovers. They were somewhat more shy than the smaller birds and fed closer to the edge of the water, but a gunshot

disturbed them only temporarily and they soon returned to their feeding. One specimen was taken on August 5th.

19. Ereunetes pusillus - Semipalmated Sandpiper. What has been said of the Least Sandpiper applies to this species - it was frequently seen on the mudflats. It is notable that neither species was ever seen on the ocean beach where they are often pictured. One speciman was shot on August 7th.

20. Crocethia alba - Sanderling. This was the characteristic bird of the ocean beach. In large flocks they ran back and forth on the sand just above the froth of the surf, dashing down, on the edge of the retreating foam, picking hastily at the sand and then rushing back up before the advancing tide of the next breaker. Their shining black legs moved with a swiftness that the eye could not follow. Only occasionally did they get their feet wet. Sometimes flocks could be seen higher up on the dry sand, resting, preening, or walking about. There must have been several hundred on each mile of beach.

The plumages varied considerably. Some individuals stood out from among the others by reason of great rustiness, but there were many which retained only a few rusty edged feathers on the breast. Most, however, approached the pale winter plumage. A male and female were taken on August 2nd and a male and two females on August 5th. All had undeveloped sexual organs, the maximum length of the testes being 3 mm. and the ovaries just discernible.

21. Larus argentatus smithsonianus - Herring Gull. Gulls were very common at Ocean City. The present species was found about the docks and on the broader waters of the bay. Hundreds often gathered over shoal water in front of our camp. We first estimated eight young to every adult but later discovered that the number of fully adult birds was considerably less than that. From dull brown first year plumage, there was a complete range with decreasing frequency up to the full adult.

22. Larus atricilla - Laughing Gull. This species was probably equally as common as the last, but because the birds did not congregate to quite the extent that the Herring Gulls did, their numbers were not so conspicuous. Also unlike the Herring Gull was the propensity of the present species for the marshes. They were frequently seen along the channels and on the mudflats. Furthermore adults were seen nearly as often as young.

23. Sterna hirundo hirundo - Common Tern. On the bay near Ocean City this species seemed to be slightly outnumbered by the following one. Search was made for S. forsteri, and S. dougalli dougalli but none was identified with any certainty. One specimen, an adult male, was taken on August 2nd. This bird was shot on the ocean beach where the species was more common than in on the bay. Individual birds were continually passing up and down the coast, closely following a line just above the first breakers.

In the bay about two miles south of Ocean City are some low lying islands, produced, according to local people, by the debris dredged from the channel. They rise a few feet above high tide (one bore a mound about ten feet in height - nearly a mountain in this

country) and support a very sparse herbaceous vegetation on a soil of sand and shells. From a waterman we learned that visitors were often taken to these islands to observe nesting "skimmer gulls", but that the season had passed. Later we heard that there was another nesting season in the latter part of August. Nevertheless, we decided to investigate and so paid two rather lengthy visits on August 3rd and August 5th.

Nests were numerous, but it was quite evident that the season was over. A few nests were found containing eggs, usually one. It appeared that most of these were infertile. A large number were punctured. One nest was found with two eggs which seemed to be good. While we were photographing it a particular adult stayed directly above us by heading into the wind and kept up a continuous screaming. We were of the opinion that this nest was a very late one. One chick, recently hatched and still moist, was found dead in another nest with one egg. No other chicks were seen on this island. It is possible that the whole attempt at nesting had been a failure. However, on August 5th on a neighboring island we found a single older chick, well able to run about. It is quite possible that we missed many, since they are almost impossible to see unless moving about.

24. Sterna antillarum antillarum - Least Tern. Near Ocean City, the highway bridge, and the harbor, this was the commonest tern. Farther down the bay the species was not seen so often.

Both young and adults were to be seen almost constantly about our camp and beside the lagoon. Their flying was usually accompanied by their high piercing screams, but when they were resting on the mudflats they were usually very quiet. In fishing they generally headed into the wind to cut down their speed. Often they hovered at a distance of ten or fifteen feet above the water. When a certain fish had been sighted and determined upon there was a quick, arrow-like plunge and the fish was caught. Usually the food was only three or four inches long.

The young ones practiced fishing in the manner of their parents but apparently without much success, for they were often fed. When an old bird caught a fish the young would follow it about begging. When being fed the young one would alight on the water briefly and the parent would hover in front while the food was delivered, after which the young one again would take wing. The whole transaction consumed barely fifteen seconds.

On the islands mentioned above, no birds of this species were seen. However, their were large numbers of the dessicated carcasses of fairly well-fledged least tern chicks scattered about. We could find no evidence of the manner in which they met their fate.

It is well known that the mortality among chicks in colony-nesting sea birds is large. Two recent studies, the one on herring gulls (Deusing, Wilson Bulletin, 51:170-175, Sept. 1939) and the other on Arctic terns (Pettingill, Auk, 56:420-428, Oct. 1939) show that wandering chicks may be killed by adults of their own species when trespassing on neighboring territories. Chicks are also sometimes killed wantonly by so-called "rogue" adults. Two

other possibilities occur in the present situation: predation by the larger species nesting on the same islands, and destruction by the trampling of herbivores. There are numbers of wild ponies and half-wild cattle on the dunes of the barrier beach. Since the water between the islands and barrier beach is often only a couple feet deep , even though the distance is considerable, it is possible for these animals to wander back and forth. There was abundant evidence that this had occurred. It is easily to be seen that in the middle of the nesting season the presence of such animals would be a great hazard to ground nesting birds.

25. Chlidonias nigra surinamensis - Black Tern. This species was observed in small numbers whenever we visited the ocean front but at no other place. At no time did it occur in groups, always as scattered individuals flying along, mostly southward, just above the surf. The dark plumage of the summer adult was seldom seen. Most birds were in the molt, presenting a rather odd pied effect.

26. Rynchops nigra nigra - Black Skimmer. Skimmers are probably the most interesting of the summer birds of Ocean City. Their bold coloration, their graceful flight, their curious bills, and their odd habits combine to present a picture which catches the eye of even the most casual visitor.

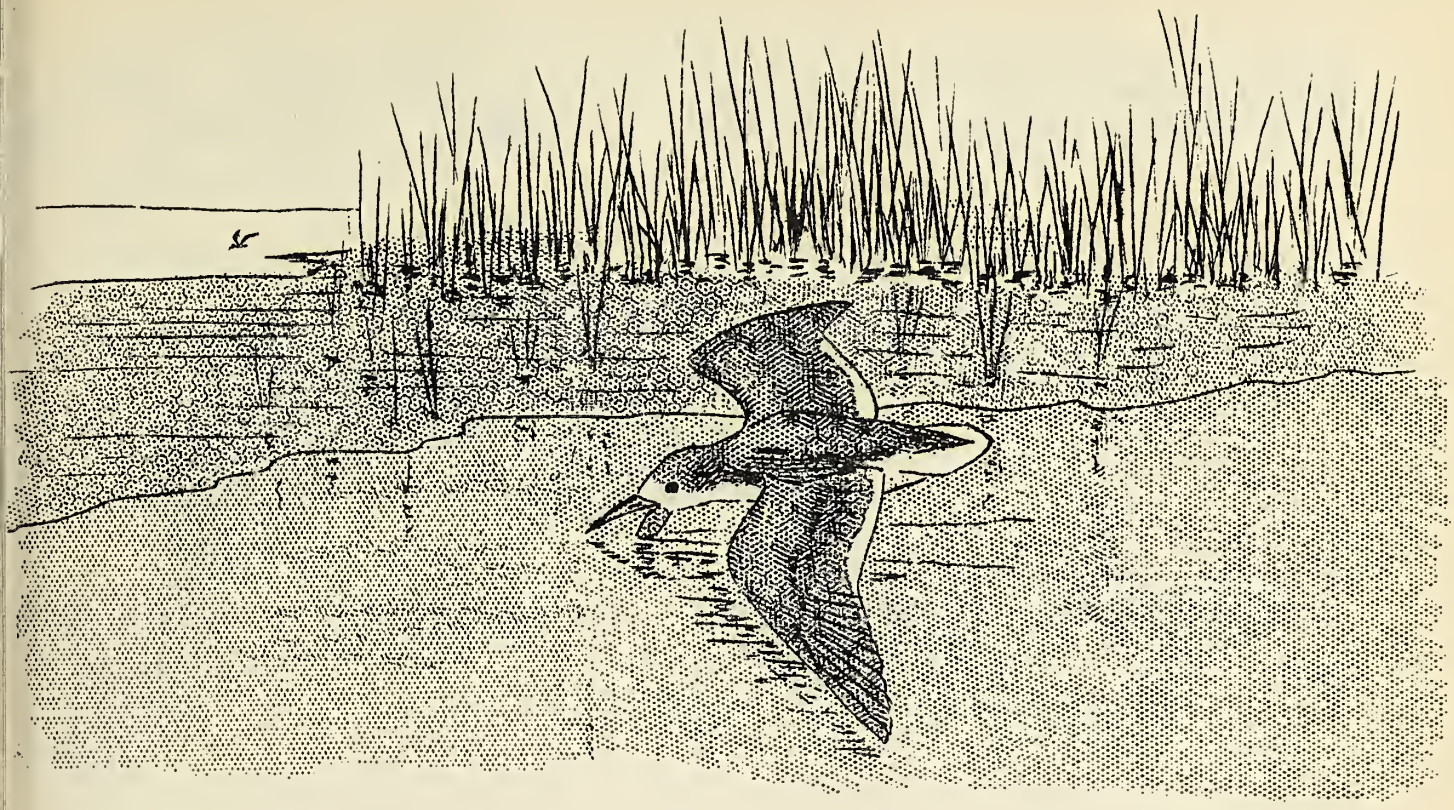
These birds were seen everyday on the bay, never on the ocean front. They tend to be somewhat crepuscular in feeding habits. They were most frequently noted near our camp in the early morning and in the late afternoon. At such times they were to be seen cutting the surface of the water with their blade-like lower mandibles as they followed the winding channels in the marsh or traversed the edges of the lagoon.

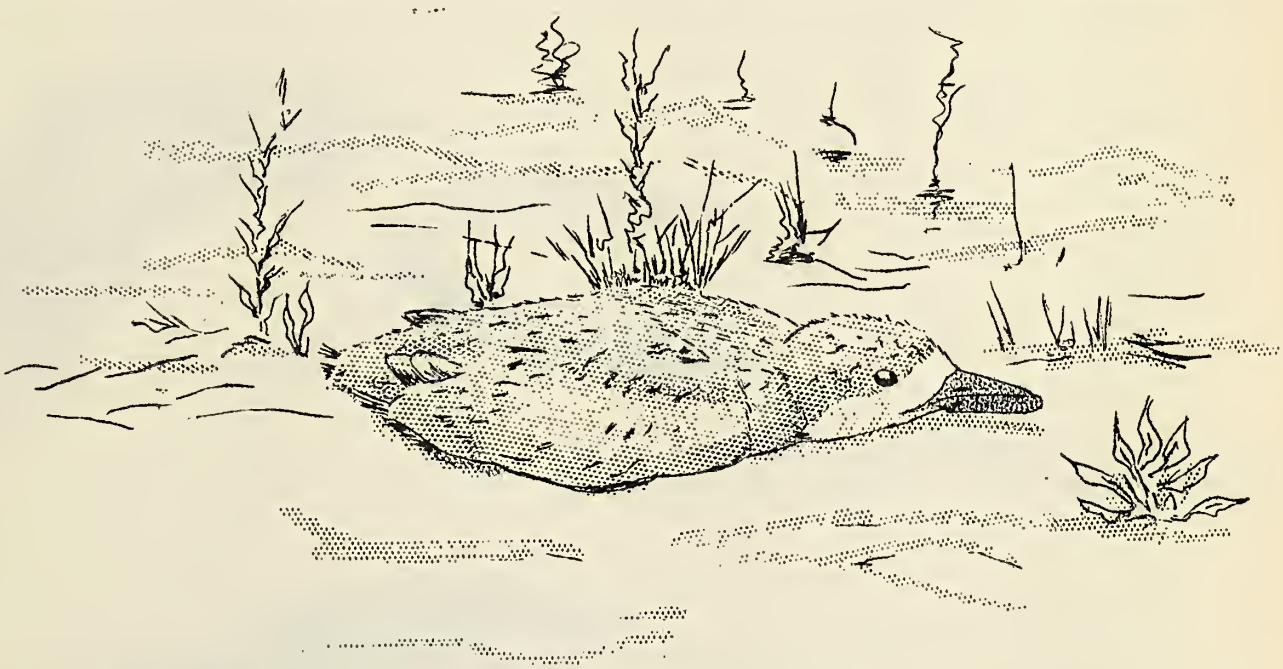
The islands mentioned above were the breeding places of these birds as well as of the terns. The skimmers were evidently somewhat later than terns for we found considerable numbers of young and one set of eggs.

As we approached the island the adult skimmers could be seen standing or sitting - their legs are so short that there is little difference between the two - on the beach of the leeward side of their island. When it became plain that we were going to attempt a landing the whole flock of birds rose in a single mass of flashing black and white and flew out to meet us with a harsh cacophony of terrier-like barks. When we landed the band broke up but all continued to circle around the island and yelp during the entire time of our visits.

On August 3rd we visited only the first island. We found a good many young birds but none old enough to do much running about. They lay flat against the sand in a shallow depression which they created with movements of feet and body. The down was such that it was very difficult to see the chicks against the sand. The larger feathers were beginning to show on some of the older chicks and the lower mandible had already at this stage begun to lengthen beyond the upper one, although as yet there was no sign of color.

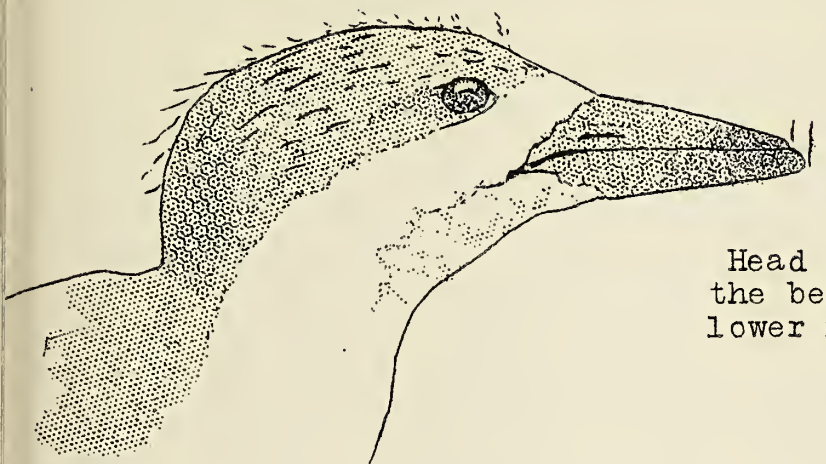
Unlike the tern nests, those of the skimmers were mere depressions in the sand without pretense at lining. They were, in



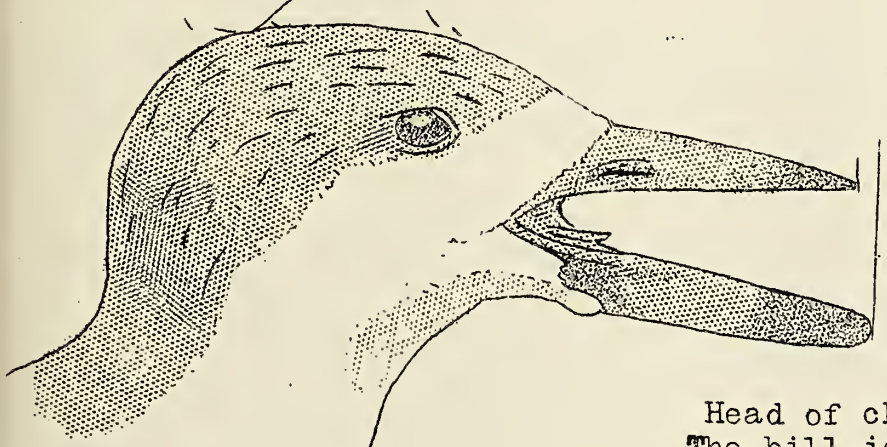


1. Adult Black Skimmer "skimming" the shallow water on the edge of the lagoon.
2. Young Skimmer, showing characteristic pose adopted when a person approached the nest.

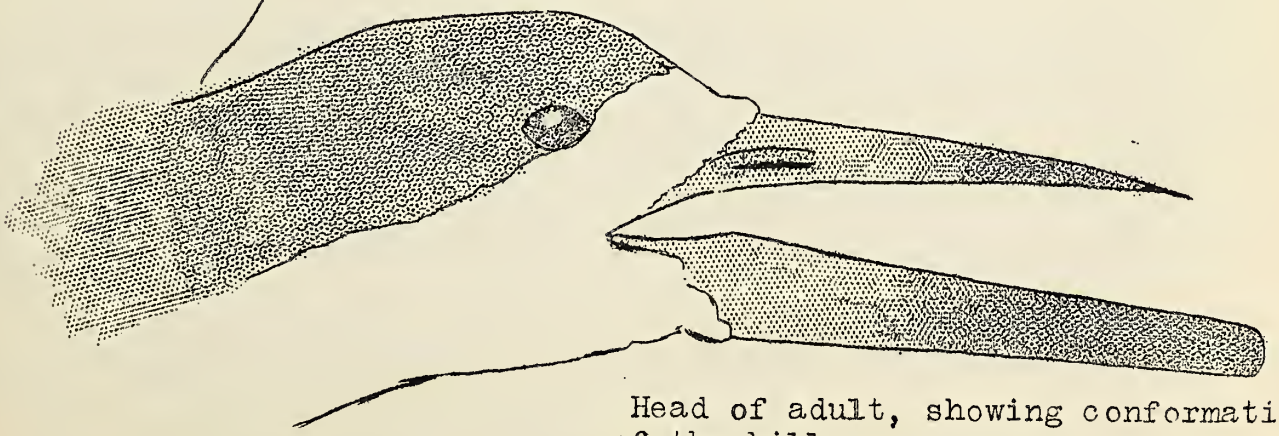
Two day old chick, showing normal bill and the egg-tooth still retained



Head of an older chick, showing the beginning of elongation of lower mandible



Head of chick about ready to fly. The bill is nearing adult proportions



Head of adult, showing conformation of the bill

general, located together at one end of the island away from the tern nests. There was little evidence of nest mortality for this species - no punctured eggs, and few pieces of eggshell.

We found one nest still containing eggs. There were two eggs and one had begun to hatch, for it contained a single chipped hole, through which we could see the bill of the chick with its white egg-tooth. When we returned to the island on August 5th both eggs had hatched and the chicks were in the characteristic procumbent position. The eggshells had not been carried away. One chick was noticeably larger than the other, probably a day older.

The season was further along on the second island. No nests were found there and nearly all the young were old enough to run about. Many which we chased attempted to get on the wing by facing into the breeze. Some were much too young, some managed to get off the ground, only to fall back again, while others sailed off in fine fashion. Many of these, no doubt had never flown before the stress of our presence forced them into it. It was our impression that they were not always entirely conscious of what they were doing, for several were an air of astonishment when they found themselves lifted from the ground. Such however, is the power of avian instinct that they were able to maintain their stability in the strong breeze and even to vary their maneuvers, as did the adults, with shifts in the relative direction of the wind, though with not quite the same deftness.

We saw only two such birds come to grief. They were forced down into the water about forty yards from shore. Immediately they began swimming shoreward and were well able to take care of themselves without being rescued. We never saw an adult on the water.

This is a most interesting species of bird, as much so to the ornithologist as to the idly curious public. Maryland is fortunate in possessing at least one colony of them and their presence ought to be encouraged. There is no doubt that they add an extra touch to Ocean City as a recreatory spot and those boatmen who gain some small part of their livelihood from taking visitors to the colony might well make the preservation of the colony an object of their especial concern.

27. Antrostomus vociferus vociferus - Whip-poor-will. A whip-poor-will was heard on the evening of August 4th from the woods to the west of our camp. This was one of a number of species of land birds which we heard or observed.

The following notes on land birds are, in general, intended merely to complete the list of our Ocean City observations. As stated above we made no attempt to hunt out land birds, except as they were associated with marshes as in the case of Ammospiza, noted hereafter.

28. Chaetura pelagica - Chimney Swift. Swifts were numerous near the town.

29. Colaptes auratus luteus - Flicker. Observed only once, August 2nd.

30. Tyrannus tyrannus - Kingbird. This is a bird which is often seen on beaches along Chesapeake Bay. At Ocean City it is also fairly common along the beach of Sinepuxent Bay.

31. Myiarchus crinitus boreus - Crested Flycatcher. One was seen during a brief visit to the pine woods.

32. Hirundo erythrogaster - Barn Swallow. Very common about the bridge and along the shore of the bay. This species probably nests under the bridge as it does in all our tidewater country.

33. Penthestes carolinensis carolinensis - Carolina Chickadee. Several were seen during a brief visit to the pine woods.

34. Telmatodytes palustris palustris - Long-billed Marsh Wren. This abundant inhabitant of Chesapeake marshes was not common at Ocean City. It seems to prefer cattails and these were not to be found on the strong salt marsh. A few birds were seen in a patch of high sedges, and an empty nest was found on the bay side of the barrier island.

35. Dumetella carolinensis - Catbird. Noted twice on the edge between the marsh and the pine woods.

36. Turdus migratorius (subsp.?) - Robin. A few were found in the pine woods.

37. Sturnus vulgaris vulgaris - Starling. Found among buildings along the road west of Ocean City.

38. Geothlypis trichas trichas - Maryland Yellowthroat. Like the marsh wren this is an abundant bird on inland marshes. It was seen only once by us at Ocean City - among a tangle of Myrica on the edge of the marsh near our camp.

39. Sturnella magna magna - Meadowlark. On August 4th one was seen on the grassy flats of the bay side of the barrier island north of Ocean City.

40. Richmondena cardinalis cardinalis - Cardinal. One was noted on the border between marsh and pine woods.

41. Ammospiza caudacuta (subsp.?) - Sharp-tailed Sparrow. This and the following species we were especially desirous of finding since both are characteristic of marshes. Two Sharp-tails were taken near the lagoon. They lived among the short marsh grass and on the adjacent sandflats. In the latter places they could frequently be seen running about almost like larks. Both species were very shy and quite elusive. Young birds predominated; the nesting season was probably long over. Two immature males were taken August 4th.

42. Ammospiza maritima maritima - Seaside Sparrow. This species dwelt in the high marsh grass and among sedges. It was found in the marshes on the bay side of the barrier island as well as in the marshes of the mainland. Four specimens were taken.

43. Melospiza melodia melodia - Song Sparrow. These sparrows

were marsh birds in the vicinity of Ocean City with the same elusive tendencies of the Ammospizae. We secured only one specimen. The birds of this species which inhabit the Atlantic coastal strip are supposed to belong to a pale race known as M.m. atlantica. So far as our single specimen shows, the birds about Ocean City, however, are typical melodia. Nevertheless, this is, of course, far from conclusive and a good series of the species from this locality is one of our greatest desiderata.

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NOTES FOR THE MONTH OF OCTOBER

Meetings and Lectures at the Society

October 3	Talk by Mr. Gilbert C. Klingel, "Some Additional Notes on the West Indian Expedition."
10	Talk by Mr. Clyde F. Reed, "Plants of Dorchester County."
17	Travel Movies of Palestine and Dalmatia.
24	Lecture by Mr. Edward P. Henderson, United States National Museum, "Composition and Structure of Meteorites."

Junior Division

October 7	Lecture by Mr. Gilbert C. Klingel, "The Island of the Wind."
14	Talk by Harold Levy, "Notable Minerals around the Wyman Park Bridge."
	Talk by Joseph Bures, "Migration."
	Travel Movies of Palestine and Dalmatia
21	Discussion on Nomenclature and Taxonomy
28	Talk by Romeo Mansueti, "What We Should Know about Maryland Mammals."

Lectures, Exhibitions and School Loans

October 3	Pimlico School, #223, loan of Indian Artifacts.
3	Woodbine School, loan of Insects.
10	Saint Ambrose School, loan of Indian Artifacts.
17	Hagerstown Fair, Exhibition of Shore Birds, Ducks, and Insects.
17	Pimlico School, #223, loan of Birds.
27	Boy Scout Troop #165, loan of Birds.
27	Boy Scout Troop #165, lecture by Mr. Henri Seibert, "Introduction to Study of Birds."

Gifts

The Society wishes to acknowledge with appreciation the gift of a case of woodpeckers from Mrs. John White.

The Natural History Society of Maryland

BULLETIN

Volume X DECEMBER, 1939 Number 4

THE RETURN OF A NATIVE

By Allan H. Bonwill and Howard B. Owens

He is coming back to the streams and ponds of his native country once again. Castor canadensis, the beaver, is returning to Maryland's network of tiny inland waterways. Already there are three colonies of these busy fellows here, and with care and protection there is no reason why we cannot, in due time, have many more.

Beaver are important to our welfare in many little-known ways. They give us, instead of a fluctuating stream, destructive in floodtime and stagnant in drought, a living pond with well balanced flora and fauna, which is a spawning ground for fish, an erosion-check for our valuable soil, and a reservoir for time of drought.

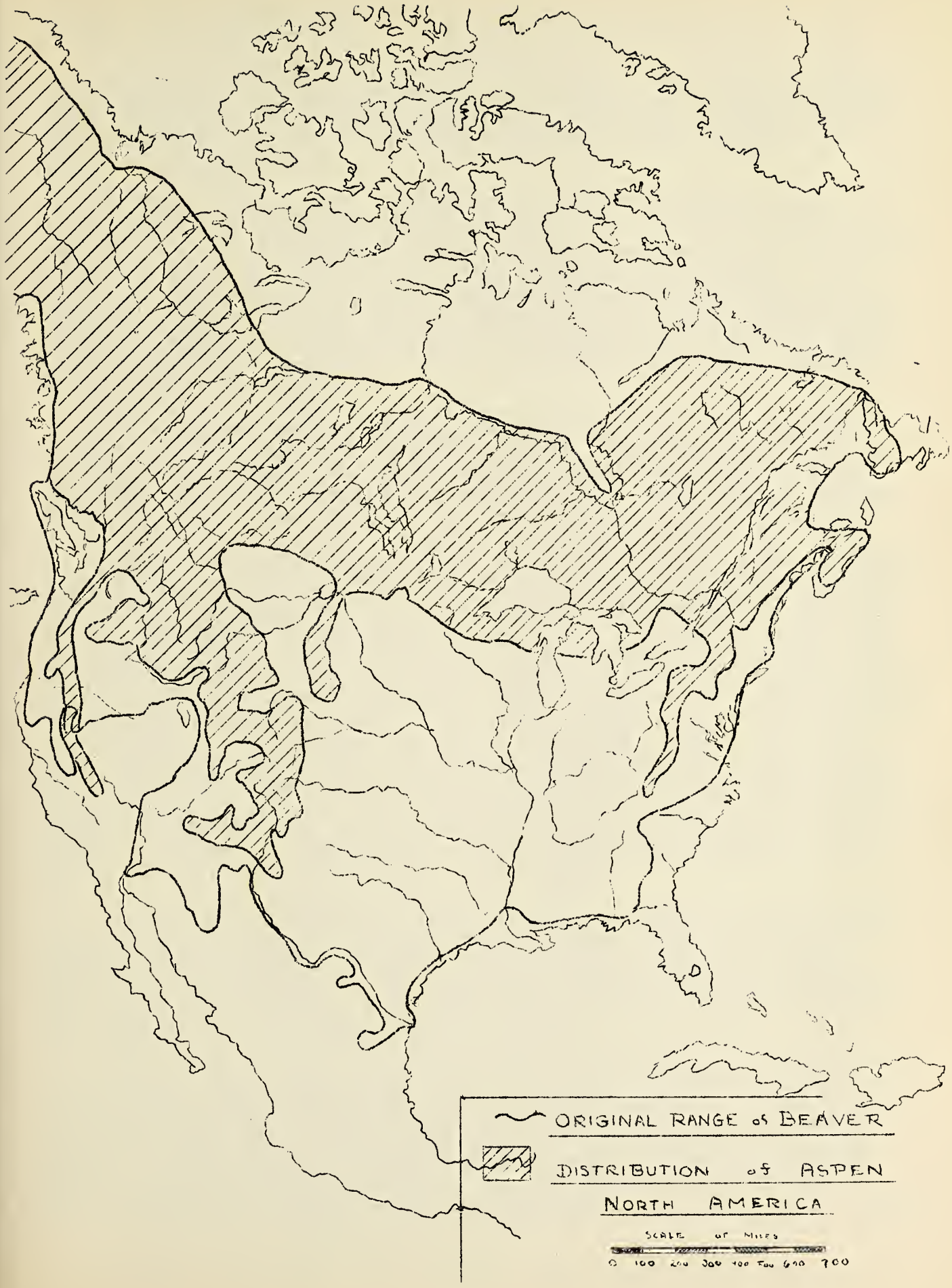
As in years gone by, soon we may have this busy helper restored to his natural habitat.

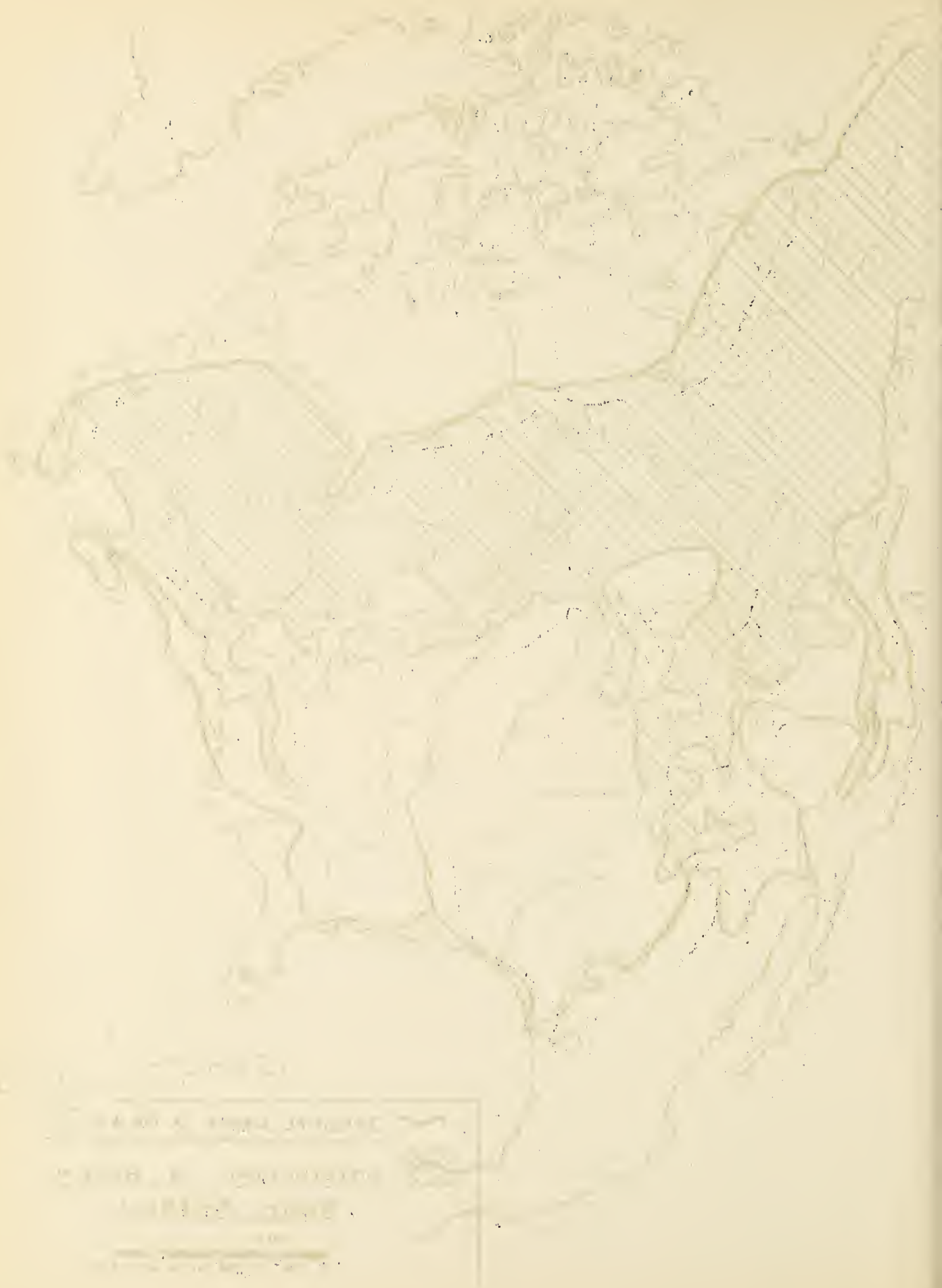
According to Cleland (2), beaver, as well as other rodents, were first known from the Eocene Epoch. Dugmore (3) says, "The beaver, both American and European, had the largest range of any animal, those in Europe having existed all over Europe, including Great Britain (not Ireland) and Asia as far as the Euphrates. During the Pleistocene period they lived in Italy as far as Rome, while the American species ranged all over North America from the Arctic Sea to Mexico." Bailey (1) has a map to show that the original range of the beaver in North America nearly coincides with the distribution of the aspen, its principal food tree. (See map on page 37)

When the first settlers came to Maryland in 1634 they probably found colonies of beaver in every likely stream and pond. However, about a century before their arrival at St. Mary's, the white man had learned from the Indians of the St. Lawrence region the value of the beaver. The craze for its fur that followed was destined to place the beaver, like land acquisition, in the role of a great force of empire-building on this continent. Through out a large part of the Indian country, the beaver pelt had been the standard of value in barter among tribes. The white man adopted this standard, and for more than a century the beaver pelt was a common unit of barter for both Indians and whites from New York to Quebec. Until the nineteenth century, beaver fur furnished the material for hats. Then the manufacture of silk, and the use of the fur of the Central American Coypu Rat, combined to force the beaver fur from its place as a hatter's material, and left it in use mainly for wearing apparel, a purpose for which it is well suited, being one of the best furs we have.

The Indians had long trapped these animals, not only for their fur, but for their flesh, which they esteemed a luxury. However, so systematic were they in their work, that the number taken from each colony was seldom in excess of what would keep the population fairly stationary. When the white man entered the competition for beaver fur, his one idea was to secure the largest possible crop of skins, utterly regardless of whether or not he "killed the goose that laid the golden egg." Thus the Indians were forced to discard their sane methods of trapping and join in the mad destruction. The result was that the beaver soon became extinct in most of the states, and nearly so in others, even though they originally seemed innumerable. Maryland was one of the states where the beaver became extinct.

In either Pennsylvania or West Virginia, some beaver escaped extinction because of their residence in remote sections, or were later re-introduced. Within recent years offspring from these colonies through their natural migrations in search of new homesteads have come into Western Maryland. Mr. Porter (5) says, "There are three colonies of beaver in Maryland - one on the Upper Potomac River near Germania, Garrett County; one on Town Creek in Allegany County; and recently a colony has been discovered by Mr. Roland Porter, Deputy Game Warden, Millington, Kent County, Md., located at a point where the Andover and Sewell Creeks meet at the


ORIGINAL RANGE OF BEAVER
DISTRIBUTION OF ASPEN
NORTH AMERICA
SCALE OF MILES
0 100 200 300 400 500 600 700



head of the Chester River in Kent County, about one and a half miles east of Millington on the road leading to Clayton, Del."

We have located and studied the colonies in Allegany and Kent Counties. It is concerning the latter that this paper has been written. The two other colonies, being in entirely different environment, must be studied thoroughly and described in some future issue.

During the spring of 1935, the Delaware Board of Game and Fish Commissioners purchased three pairs of beaver from the Supervisor of the National Forest, Maine. A pair of these beaver were liberated in each of the three counties of Delaware. At present, according to a letter received from Chief Warden R. C. Wilson, there are two colonies resulting from these liberations - one near Cheswold, in Kent County, Delaware, and the other near Burton's Pond, in Sussex County. It is with the former colony that we are concerned.

Game Warden Edward Boggs, of Cheswold, took a pair of the beaver to the farm of Mr. Harry F. Urian, and liberated them in a small stream-swamp known as Willis Branch, which flows into Garrison Lake, an artificially formed lake. This swamp, either then, or later, was posted as a state game management refuge.

These mammals from down East apparently found their intended habitat suitable, for they soon began felling small trees, mainly willows and alders, that grew in or beside the stream. Logs and brush from these were placed parallel to the sluggish flow, with butt-ends up-stream, some of the material being forced well into the muddy bottom. Mud and gravel, obtained from the bottom immediately up-stream, was placed on these branches. Other layers of brush were placed upon the first, each in turn weighted down with mud, until the structure reached the desired height. At first the water leaked through the loosely constructed affair, but the stream brought down sediment which helped to make it water-tight. More mud was placed on the upper side and the top, until finally, holding water to its crest, a completed dam meandered from one clump of alders to another all the way across the stream, a distance of about one hundred and forty feet.

Of course, the dam was never really finished as long as the pond was occupied, for it not only required continual attention to keep it in ordinary repair, but the pond tended to fill up with the silt brought in by the stream. This naturally lessened the depth of the water, and made it necessary for them to raise and lengthen the dam from time to time.

This arduous work of dam-building was not for the purpose of creating a swimming pool, as some people seem to imagine, but to keep the water of Willis Branch at a constant level. With a constant water level they could conceal the entrances to their lodges, and so prevent the entrance of foxes or other land animals. A place for the safe storage and easy transportation of their winter food supply would be provided. This pond also assures a place of retreat in case of attack.

On the east bank of the stream, and about one hundred and

twenty-two yards above the dam, the beaver next began work on a lodge. First they dug a canal about two feet wide, two feet deep, and eight or ten feet long, through the shallows near the bank. From this canal they tunnelled into the bank for about another ten feet, and finally brought their tunnel to the surface. Over this exit they heaped a roughly arranged pile of brush, sticks, mud, and grass, until the whole was about six feet in diameter, and two feet high. These materials were brought up the bank over a small path, or slide, which they cleared.

Gradually, as the mound became large enough, the inside was hollowed out, then more and more material was added to the outside until the whole structure was nearly light and water proof. (This is the way leading authorities believe the lodges are constructed, though it has not been definitely proved.) As soon as the nights were cold enough to freeze they completed the lodge by plastering it over with several inches of mud. Some authorities believe that the center of the lodge-ceiling is left somewhat thinner to provide sort of a ventilation flue.

During the building of the dam and the lodge the bark from the sticks used probably furnishes the beaver with most of their food. Now, with these completed, and winter coming on, it was necessary for them to store a food supply against the time when they would be confined under the ice. Through the swamp they went, and up on both banks, felling trees that suited their needs. Their search for food took them out even into Garrison Lake, and trees were cut far up into its south-eastern cove, perhaps a quarter of a mile or more from their lodge. Some of this material was transported as soon as it was felled, some of it was gathered later, and some of it was not utilized at all. In a spot convenient to the lodge the larger material was anchored to the bottom by placing mud upon it. This was not difficult, because being green it lacked buoyancy. Other branches were locked into this first tier, until finally a sufficient pile of food was safely stored.

With the freezing over of the pond the beavers discontinued their tree-felling activities, and took up their winter life under the ice. Of course, they sometimes found a hole where a spring had kept ice from forming. On the edge of this hole they would sit and feed on some of the bark from their food pile, leaving about little piles of chips. These helped us read the story of their winter life.

Several young were born, probably during the spring of 1936. These were very likely cared for by their mother, while the father spent considerable time exploring adjoining water courses.

Again winter found them prepared. Their dam had been carefully kept in good condition, an adjoining lodge had been built beside the first to accommodate the new members of the family, and sufficient food had been stored.

Throughout the winter Warden Boogs and Mr. Urian kept their usual watch over the little colony, allowing only trusted visitors to see their sign, but somehow during the early part of 1937 some

local trappers succeeded in poaching a pair of the beaver. These culprits and their fence were later punished.

With the approach of autumn their pond looked deserted, as if they had migrated to a more sympathetic environment, but further investigation disclosed a different story. The colony had moved down-stream about one hundred and fifty-eight yards from their first dam and built another about one hundred and eighty-five feet long. Their new lodge was out in the newly formed pond about twenty-five feet from the west bank, and fifty yards down-stream from their first dam. It was about six feet in height, and showed a higher degree of lodge-building skill than their first. (See map on page 41)

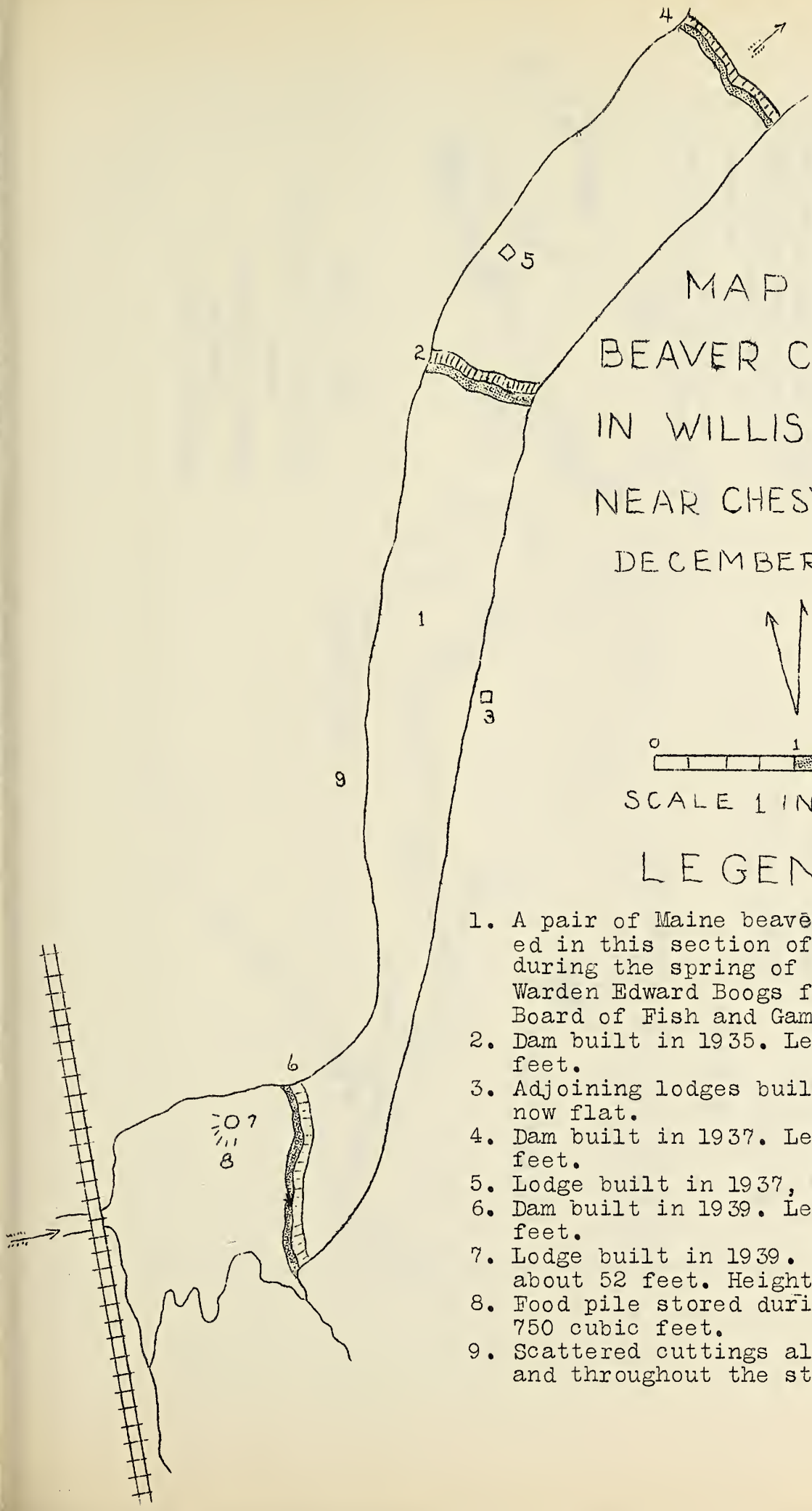
The winter probably passed uneventfully for the beavers. Many visitors came to view the new pond, and were proudly escorted to its shores by Mr. Urian. "Aren't they terribly destructive?" misinformed guests frequently asked, but Mr. Urian quietly shook his head, and replied that the few trees they destroyed had scarcely any value to him. He enjoyed seeing the results of their work, even though he had never caught a glimpse of the beaver themselves. Later he pointed to his wood-pile, which had recently been replenished with several loads of beaver-cut logs.

If you had been standing on the low bank where Willis Branch flows into Garrison Lake one moonlight night during mid-summer, you might have seen a pair of beaver swim by. They would probably have appeared to be going somewhere, but in no particular haste, for they might have paused now and then to nibble a few twigs off an overhanging tree-limb; and one or the other, rearing its head and shoulders well up might have brought its tail down on the water causing a rifle-like report, at which both would have dived, only to reappear a few moments later to continue casually on their way. These would have been a pair of two-year old beaver on their "honeymoon" prospecting for a new homestead. (See map on page 42)

Out of Garrison Lake and up Pinks Branch, against its tardy current, they probably swam. Daylight found them sleeping under the shelter of tree-roots overhanging the bank, or some other secluded location. Each evening they resumed their journey toward the setting sun, feeding, playing, or sometimes lingering to make little "mud pies", over which they voided their castoreum. These musky, cairn-like signs would serve for a time to convey a log of their journey to any beaver that might be following them.

One night they may have reached the very source of Pinks Branch, but instinct urged them on. Going over land was not only difficult for them, but dangerous, for if they were attacked by enemies, escape would be hard won. Fortunately the headwaters of Jordon Branch were very close and soon they were on their way down-stream in their natural element.

Into Sewell Branch, and on past the Maryland line they swam, for of course political boundaries meant nothing in their lives. At the junction of Sewell and Andover Branches, deeper water, the result of Stankie's old mill pond, probably seemed a likely place



MAP OF BEAVER COLONY IN WILLIS BRANCH NEAR CHESWOLD, DEL.

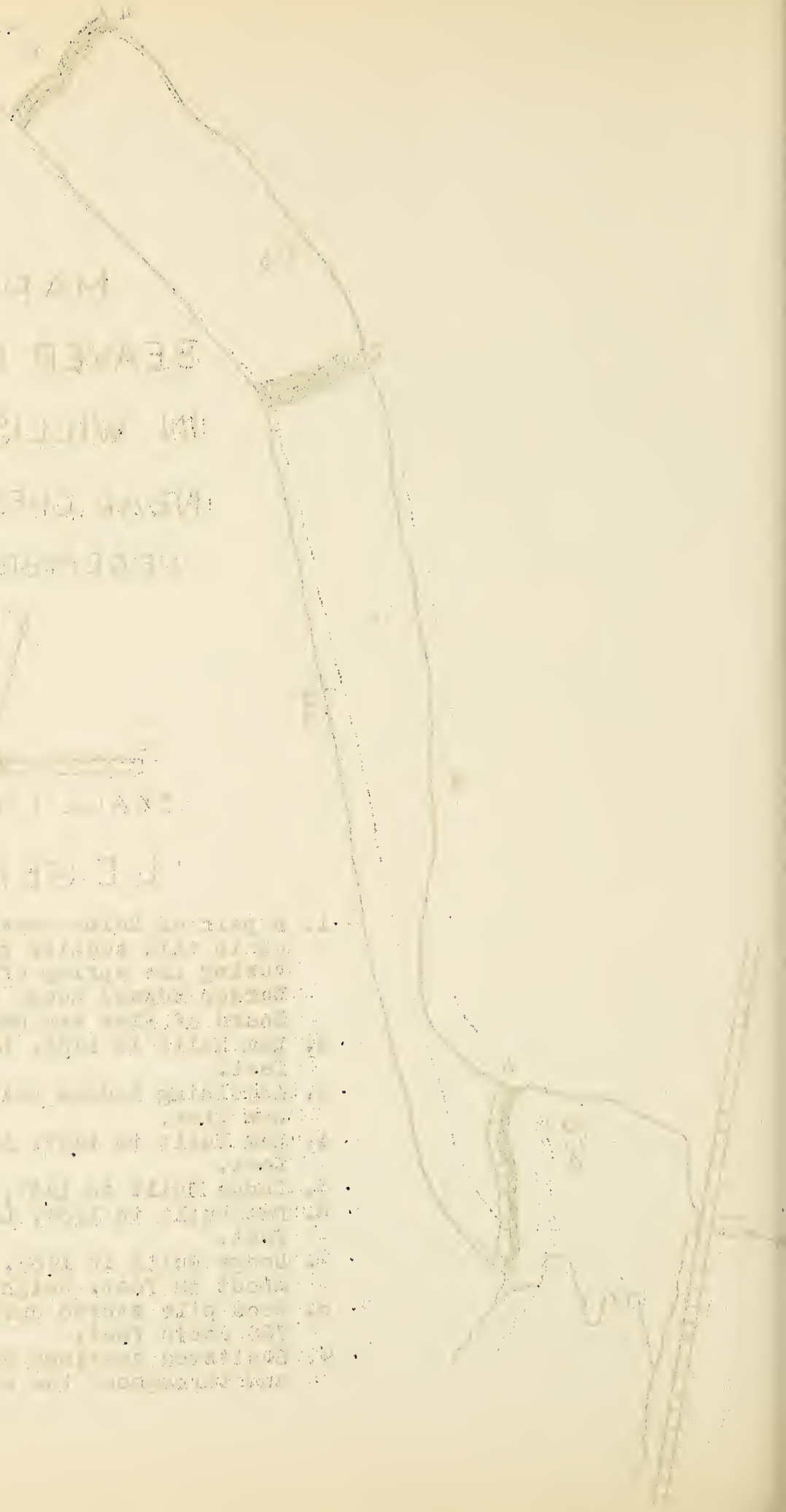
DECEMBER 31, 1939.

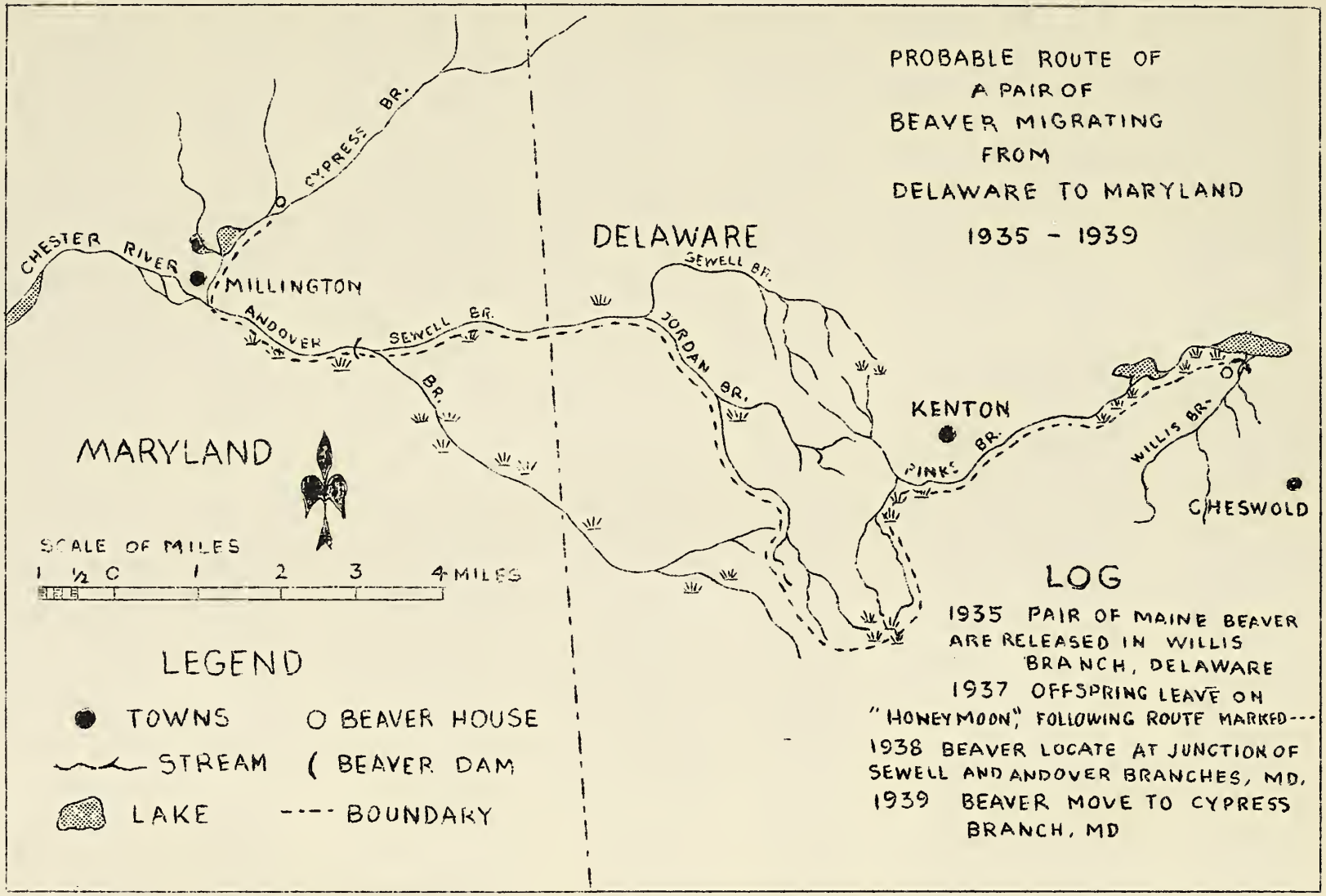
0 1 2

SCALE 1 IN. = 160 FT.

LEGEND

1. A pair of Maine beaver were liberated in this section of Willis Branch during the spring of 1935 by Game Warden Edward Boogs for the Delaware Board of Fish and Game Commissioners.
2. Dam built in 1935. Length about 140 feet.
3. Adjoining lodges built in 1935, but now flat.
4. Dam built in 1937. Length about 185 feet.
5. Lodge built in 1937, but now flat.
6. Dam built in 1939. Length about 304 feet.
7. Lodge built in 1939. Circumference about 52 feet. Height about 6½ feet.
8. Food pile stored during 1939. About 750 cubic feet.
9. Scattered cuttings along both banks and throughout the stream swamp.




PROBABLE ROUTE OF
A PAIR OF
BEAVER MIGRATING
FROM
DELAWARE TO MARYLAND
1935 - 1939
DELAWARE
MARYLAND
CHESTER RIVER
MILLINGTON
CYPRESS BR.
ANDOVER BR.
SEWELL BR.
SEWELL BR.
JORDAN BR.
KENTON
PINKS BR.
WILLIS BR.
CHESWOLD
SCALE OF MILES
1 ½ 0 1 2 3 4 MILES
LEGEND
TOWNS
O BEAVER HOUSE
STREAM
(BEAVER DAM
LAKE
---- BOUNDARY
LOG
1935 PAIR OF MAINE BEAVER ARE RELEASED IN WILLIS BRANCH, DELAWARE
1937 OFFSPRING LEAVE ON "HONEYMOON", FOLLOWING ROUTE MARKED---
1938 BEAVER LOCATE AT JUNCTION OF SEWELL AND ANDOVER BRANCHES, MD.
1939 BEAVER MOVE TO CYPRESS BRANCH, MD

to settle. At any rate, they spent the winter there, perhaps in a bank-den. A crude dam was also built.

When the balmy breezes of spring transformed the water of the old mill pond back to its usual state of liquidity, the dam yielded to the strain of rising water, and drifted down-stream about fifty feet. Here a portion of it jammed against some tree roots in the middle of the stream, and was stranded by the retreating water.

On the ninth of April, 1939, taking advantage of a favorable wind and an overcast sky we stalked quietly to the old mill pond. It seemed deserted, and all was quiet except for the occasional hooting of a barred owl. Suddenly something caught our eye. Yes, it was true, right there before our eyes, and in the middle of the day, two beaver were swimming about the remains of their ill-fated dam. We watched them awhile. Then swimming out into the swift current, they allowed themselves to be drifted down-stream, and out of our sight.

When we again returned to the site of Stankie's old mill pond on September the twenty-third, it was obvious that the beaver had not been there for many weeks. Where could they have gone? Would we lose trace of them? We decided to imagine where we would locate if we were beavers.

North of Millington, Kent County, Maryland, there are two beautiful mill ponds, known as Higman's Small Mill Pond and Higman's Large Mill Pond. These ponds are connected by a canal, and from the smaller a mill race carries water to one of the few overshot water-wheels operating in Maryland. This mill is operated by J. E. Higman and Sons.

These ponds seemed to meet our specifications for a beaver colony site, so we began asking people around Millington if they had heard of any beaver being seen recently. Many people knew nothing about them, but finally we were told to see Deputy Game Warden Roland Porter or Chief of Police Edward Squires. These men were said to be trying to protect the beaver, and might know their present whereabouts.

Fortunately, we contacted Mr. Squires. He kindly offered us the use of his rowboat, and pointed out a cutting he had noticed along the canal. He also mentioned having seen some cuttings along Cypress Branch, which flows into the far end of the larger pond.

We rowed across the small pond, through the canal, across the large pond, and entered the mouth of Cypress Branch. A flock of mallards reluctantly abandoned their feeding in the shallows, and with much quacking headed overland toward the small pond. A great blue heron squawked his added protest, and with poised wing-beats moved on around the next bend in the stream. A muskrat swimming along the shady bank seemingly faded away before our curious gaze. Painted turtles slipped noiselessly off mossy logs, or altered their under-water course to avoid our intruding oars. What a perfect habitat for the Eastern Shore's only beaver colony. Would we find a lodge or other evidence of their settlement?

Beaver-cut timber began to show up on either bank. Some of it was partly cut, some of it had lodged in nearby trees while falling, and some of it had splashed into the stream. Look at the size of that cutting! A sweet gum twenty-three inches in diameter. As the stream grew narrower the cuttings grew scarcer, until finally it was evident that the beaver had not frequented this section of the Branch.

Where was their lodge? Were they going to live in a crude bank-den again this winter? Coming up-stream we remembered passing a small island near its mouth. Just behind the island, and separated by about twenty-five feet of water, was a peninsula jutting out from the left bank. Why had we not looked there? That might make an ideal location for a lodge. We rowed quietly through the channel, searching each bank with our eyes for some tell-tale sign. Sure enough, there it was, a small lodge about six feet in diameter, and eighteen inches in height, on the edge of the peninsula. Crude, to be sure, but the type their parents had lived in when they were born, and much better than their last winter's den.

The water in front of the lodge was two or three feet deep, and would remain about constant the year around, so locating the entrance tunnel was probably simple. We rowed around to the east side of the peninsula, and there we found an opening in the bushes to a slide going to the top of their lodge. Over this path the lodge-building materials had been transported. In fact, the slide was still muddy from its use the previous night. The beaver themselves, as usual, were not to be seen.

Meanwhile, back in Willis Branch during 1939, the colony, perhaps to get a much greater depth of water, had moved up-stream about four hundred and fifty yards from their 1937 dam and built another about three hundred and four feet long. This is the longest dam we have ever measured, but one mentioned by Mills (4), on Jefferson River, near Three Forks, Montana, was a little more than seven times that long.

About twenty-three yards above the 1939 dam, they built an island lodge. This type represents the highest degree of lodge-building technique. It measured fifty-two feet in circumference and six and one-half feet in height. Beside the lodge was a crescent-shaped food pile, which we estimated to contain about seven hundred and fifty cubic feet of sticks.

Returning to the colony in Cypress Branch to make the final check-up before winter, we searched for their food pile, but failed to find any. Whether we overlooked it, or they actually failed to provide one remains to be discovered. Let us hope that they do have sufficient food safely stored away, and that next spring will reveal their presence as a well established colony.

These former natives of Maryland have returned. Some of them, especially those from the colony in Willis Branch, near Cheswold, Delaware, come to us from a thoroughly posted and otherwise protected refuge. Let their return be not in vain. May each of us pledge our active support to encourage our government to give them all possible protection.

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KNOW YOUR MUSEUM

Grebes

It is stated by many ornithologists that the grebes are one of the lowest forms of birds. These birds spend almost their entire life in the open water. Grebes' nests are usually rafts or islands of water-soaked vegetation; three to nine dull white eggs are laid therein. Often when leaving their nest they cover up their eggs with grass and other plants. The young after hatching, when they

are dry, take immediately to the water. They are awkward on land, and either lie flat on their breasts or sit erect on their tails and entire feet.

Their food consists of fish and other small forms of aquatic life, with which feathers are mixed. It is thought that these feathers act as a strainer to prevent fish bones and other large particles of food from passing into the intestines until they are properly digested.

The feet of these birds are unlike ducks, geese and loons in that they are lobe-footed instead of web-footed. Grebes are wonderful divers and are known to many as "Hell-divers", or "Water-witches".

In our Museum we have two of the possible three species known to Maryland - the Horned Grebe and the Pied-billed Grebe. The third species is Holboell's Grebe.

E.B.F.

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NOTES FOR THE MONTH OF NOVEMBER

Meetings and Lectures at the Society

November 7 Talk by Mr. Oscar Helm, "Corals - Past and Present."
14 Talk by Mr. David L. Elliott, "Alaska - Uncle Sam's Spare Tire."
21 Lecture by Dr. Charles F. Elvers, "The Greatest Archaeological Puzzle - The Ancient Americas."
28 Talk by Mr. W. Bryant Tyrrell, "Some Interesting Notes on the Barred Owl, Cooper's Hawk, and Humming Birds."

Junior Division

November 4 Lecture by Mr. C. Haven Kolb, "Field Approach to Plants."
11 Talk by Miss Ruth Fishpaugh, "A Trip to Catoctin."
18 General Discussion on "Evolution."
25 Talk by Henry C. Eichhorn, "Recapitulation Theory."

Exhibitions, Lectures and School Loans

November 3 Belair High School, - Lecture by Elias Cohen, "Snakes of Maryland."
4 Grand 25¢ Store, Loan of Birds and Mammals.
8 Sears and Roebuck Co., Loan of Birds and Mammals.
24 Pimlico Boy Scout Troop, Lecture by Mr. T. Milton Oler, "Indians that Lived in Maryland."
25 State Teacher's College, Loan of Birds.
30 Millersville, Loan of Birds.

The Natural History *Society of Maryland*

BULLETIN

Volume X JANUARY, 1940 Number 5

CORAL - PAST AND PRESENT

By Oscar L. Helm

The term "Coral" is an ambiguous one, for as it is commonly used now it may refer to the dried calcareous skeletal structure alone or to the whole living organism of hard skeleton and fleshy organs. Even the origin of the term is uncertain. The English form is from the Greek, but it has been suggested that it is of Celtic origin, or of the language of some of the wild races of European nomads. The first picture that comes to one's mind, I dare say, regardless of the origin of the term, is the calcareous skeleton of an animal that is strangely enough made up of approximately 90% water. Bizarre shapes and colors such as the organ-pipe coral, the sea feather, sea pen, branching coral, the cup-shaped, fan-shaped, brain, the precious red coral, the black coral, the phosphorescent, and all variations of shades in between known colors are stimulated in the mind's eye by the word "coral".

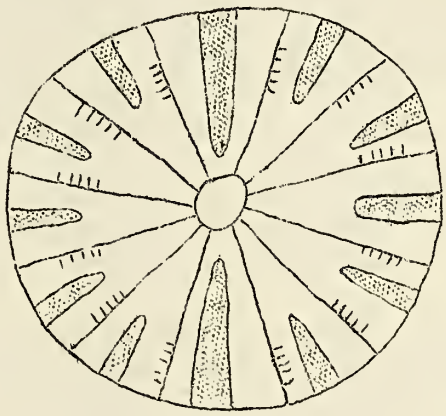
The animal is cylindrical in shape and, when fully expanded, shows a mouth in the center of a disc surrounded by a single ring of tentacles. In a colony of these animals we find they have the same structure except that they are joined together by a fleshy substance. They capture their food, which consists of floating or drifting micro-organisms, by means of cells of their tentacles which paralyze the food. These animals in the adult form do not have the power of movement in the true sense of the term, but they are able to contract and expand their bodies by means of bands of muscles. The animals are sensitive or irritable, for they respond to various stimuli by muscular contraction.

They reproduce in a season of the year by eggs and sperm. The former, when fertilized, give rise to larvae which move by means of cilia. These larvae in turn become new animals or colonies. They may reproduce either by splitting down the middle, each half creating a new animal, or by a process known as budding. A bud may appear as a slight bulge in the body wall at first and then push out rapidly into a stalk which develops its own tentacles and mouth.

In order to obtain a general knowledge of the classification

of the calcareous remains of coral, it is necessary to know something of its structure. The mouth of the animal leads down to a short throat and thence to a general body cavity. The throat is bound to the body wall by a number of fleshy bands called 'Mesenteries'. If we were to cut the animal in a transverse section it would appear as a cartwheel, the throat being the hub, the mesenteries the spokes, and the body wall as the rim. Between the mesentery there rises, due to the secretion of the outer cells of the animal, the calcareous septa that are familiar to us. It is on these septa and a few other characteristics that the classification of the coral is based. These septa are always formed in the spaces between the mesenteries, and never in the substance of them.

Relation of hard parts (thick lines) and soft parts (thin lines). Ridges indicate position of muscle.

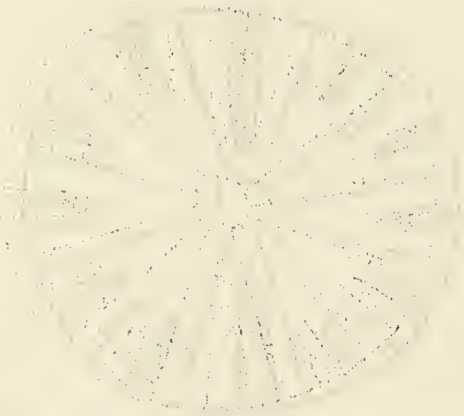


From Hickson

The present system of classification is based on the characteristics of the calcareous remains, and until a complete knowledge of the physical characteristics of the animal which formed them is known the system will remain imperfect, for the septal remains do not always correctly indicate the number of mesenteries of the living animal.

The coral animals have many mutual friendships that enable them to thrive in the teeming watery underworld. One group of polyps have living in them a little spherical cell which bears the green colored vegetable substance, chlorophyll. This does not injure or irritate the coral animal, but rather lives in a symbiotic relationship. When these cells, Zooxanthellae, are exposed to the sunlight, they make food which is used by the polyp. This may account for the statements of many observers that the animal is contracted in the daytime and extended at night, for when there is no longer any sunlight for food-making, the tentacles and stinging cells capture food. This cell is found in all stages of life, for the young cells in the ovary are invaded by these green cells from the surrounding tissue. Thus when the egg is fertilized it already has its equipment for food-making.

All groups of coral are susceptible to attacks from barnacles, worms, molluscs, etc., but one group has a rather friendly association with a little crab (Hapalocarcinus). When the crab is small it settles down between several branches of coral and by continuous irritations it stimulates each branch to give off many lateral branchlets. These new branches spread out fanwise and in time form a cage in which the crab is held for life. These crabs thus held are assured of food and a safe place to live and reproduce. In



turn they have stimulated the coral animal into its many forms of growth.

Another group of coral polyps has a most interesting association with a small worm (Aspidosiphon) and this mutual life is indicated in the dried coral by a small smooth round hole at the side of the base through which in life the worm protrudes. These corals, which live on sandy bottoms, have no way of fixing themselves on the bottom to resist the flow of water. This worm which lives and feeds in the sand acts as a muscular foot and drags the coral upright if it falls over. Living in this manner, the coral is able to feed and is not smothered in the sand, its most dangerour enemy. The young worm begins its life in a small gastropod shell. The coral larva settles on the outside of the shell and begins to grow. In time the base of the coral has completely surrounded the shell, leaving only a small hole through which the worm protrudes. Just how the larva makes the proper shell selection is not known, but if it settled on a shell without any worm the shell would soon overturn and the coral would be smothered in the sand. Regardless of how selection is made, the relationship forms one of nature's remarkable yet common phenomena.

The use of coral goes back many centuries. The records of history show that it was used in the time of the Han dynasty a century or more before the Christian era. In its earliest uses it gave color to hilts of daggers and swords, beautified shields, and formed jewelry. The use of coral as an antidote to all manner of stings, poisons, enchantments, plagues, loss of crops, and diseases, probably goes back to the story of the mythical origin of red coral as related by Orpheus of Thrace and by Ovid. It seems that when Perseus threw the head of the Medusa on the sea shore, the water nymphs amused themselves by casting branches of seaweed at it just to see them turn to stone. When the seeds of the seaweed returned to the water and grew, they gave rise to coral which is supposed, even to this day, to turn to stone when exposed to air. Minerva, being pleased with the exploit of her brother, is credited with giving coral its excellent curative virtues.

Because of the value placed on coral, a flourishing trade was built up around it and histories are full of accounts of expeditions and tradings for it. No doubt the cure-all values of the coral led to its desirability rather than its value as a jewel. John Parkinson in his "Theatre of the Plants", published in 1640, gives a long list of diseases for which it was recommended, such as consumption, sore gums, ulcers, etc. Many prescriptions of the 18th century contained red coral as an ingredient. An example of a prescription written to cure fevers, measles and smallpox is as follows:

> "Take burnt hartshorn, white amber, red coral, - of each an ounce; crab's eyes and claws, - of each two ounces; saffron half a scruple; cochineal two scruples; make them all in a paste, after they are finely levigated with jelly of hartshorn, and form into little balls, which dry and use."

Red coral is used by the natives of North Africa, peasants of Italy and other parts of Europe as a protection against the evil

eye. Black coral was also supposed to be efficacious as a love-charm, or as a cure for fascinations, or as an antidote for stings. However, in the later years when coral was analyzed, it was found to be no more efficacious than chalk and it fell into disuse.

Many fossil forms of this animal of the Coelenterate group may be found. The earliest forms are found in the Cambrian Period and resemble sponges. This led to the belief that they were not true corals, but recent study indicates that some of them are, and it is quite clear that they evolved from the Cambrian sponges. In the Ordovician Period we find three groups, - the Cup corals, Honeycomb corals, and Chain corals. All of these were tetracoralla,- that is, the radiating septa were four in number or multiples of four. These corals were rarely branched and the polyps were much larger than modern forms, ranging from half an inch to a foot or more in length. Solitary Cup corals were predominant at this time, although Honeycomb corals were abundant.

In the Silurian Period the compound or colonizing forms of coral superseded the Cup coral forms. The Chain corals reached their climax in this period. In the Devonian Period corals displayed a marked increase in numbers, species, and size. They must have grown in great profusion as proven by the many fossil coral reefs. Most of the forms were either of the Cup or Honeycomb types, the Chain corals having become rare and extinct in the early Devonian. The solitary Cup corals grew to the size of 12 to 18 inches long and several inches in diameter.

In the Mississippian Period, we find only the Cup and Honeycomb forms, and much less predominant than in the Devonian. In the Pennsylvanian Period, the forms are similar to the Mississippian but less common. The Permian Period is important in the history of coral in that we find the first appearance of the Hexacoralla, or forms whose septa were six or multiples of six in number as are the modern forms. The Tetracoralla of the previous periods, however, were still common.

During the Triassic Period, the Hexacoralla became abundant while the more ancient forms dwindled away to extinction. The corals of the Jurassic and Cretaceous period were all of the Hexacoralla type and present in abundance. In the Tertiary Period, we find the corals wholly modern in character.

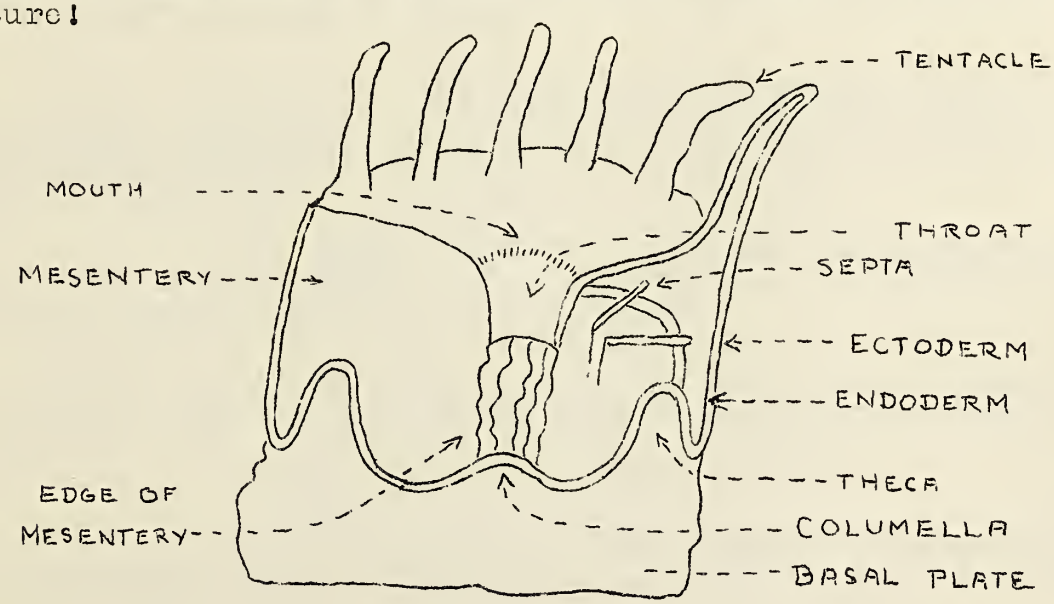
The largest visible deposit of coral in Maryland of the Miocene Period, Choptank formation, is at Calvert Beach. It is about one and three-fourths miles south of Governor's Run. This deposition is approximately nine feet above the beach, is one and one-half to two feet thick, and runs southward for about twenty feet. This group of coral is associated with Molina maxillata.

The Eocene coral discovered so far by the Paleontological group, consists of Cup coral only. This was found in the Aquia formation at the mouth of the Potomac Creek. Quite a few of the Cup coral specimens were also found in the Romney Shales, just outside of Hancock, Maryland. These coral fossils were found associated with Trilobites and Crinoids.

The coral animals present an interesting field of study to

the naturalist, the zoologist, and the paleontologist. There is much to be done despite the tremendous tasks already accomplished. This minute animal with its house, outside of which the coral polpy lives, will never cease to fascinate because of the exquisite patterns the little architect builds. From these houses other houses are built, but the owners fail to realize whence the limestone came. Navigators and travelers for generations have been keenly aware of the huge reefs that these animals have built, - rock-like structures that present beautiful hues of color but at the same time a danger that navigators must beware. Paleontologists have let their imaginations take them back to the time when these animals flourished and in their great numbers began to build these remains which give them their clues to the past generations. There are many coral animals whose habits and physical functions are not yet well known and a zoologist might spend his life gleaning these bits of information that make our picture more complete.

One never realizes the work these animals do until he reads that some animals increase in length from one to two inches a year and about two inches in diameter a year; or that under natural conditions that do not vary too much because of changes in temperature, food supply, etc., a reef might grow upwards from a shallow sea bottom at a rate of one foot in eleven-and-a-half years, or fourteen and one-half fathoms in a thousand years. We might not even wonder at these figures, but does it not arrest our attention when we see in our geography books that the Great Barrier Reef of Australia is over eleven hundred miles long and encloses a channel from ten to twenty-five fathoms deep and in some places thirty miles wide? Truly these animals that once had their place in medicine, in sorcery, and in wealth as precious stones, still have their place in this streamlined mechanized age as they continue to change the physiognomy of our earth with their Lilliputian architecture!



(FROM HEGNER)

DIAGRAMMATIC VIEW OF CORAL ANIMAL

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Additional Archaeological Material from the Hughes Site, on the Potomac River, Montgomery County, Maryland

The Department of Archaeology recently acquired from Mr. Nicholas Yinger a collection of Indian artifacts from the Hughes site. Most of these are made of bone, but some are of shell, stone, and clay. Some of these artifacts are illustrated in Plate I. A description of the Plate with a list of the total number of objects acquired follows.

Plate I. a - Awl made from a deer scapula. Seven others acquired were broken.

b - Seven blunt punches on flaking drifts. In our own work at this site we found only one of these objects.

c - Seven more or less complete antler arrow-points and two (at the extreme right) merely cut off but not bored.

d - A slender awl made from what appears to be a fibula of some small animal.

e - Two flat needles, both broken, made from ribs. The shorter fragment is the point and is highly polished and very sharp, while the longer piece is broken at both ends and lacks the perforation, provided there was one.

f - Eight tubular beads made from bird bones. The larger specimens are highly polished on the exterior and also to a great extent on the interior.

Aside from those shown there were four broken beads in the lot, also a few cut bird bones from which beads had been removed.

g - A perforated pendant of bone.

h - One complete pendant made from the baculum of a raccoon; also a broken one. In addition to these, there were six badly broken specimens in the collection.

Not shown on the plate were eight broken beaming tools made from cannon bones of the hind leg of the Virginia Deer and two broken specimens made of upper leg bones. There were also a few sections of antlers, showing that the tines had been cut off,

presumably for use as arrowpoints.

i - A few beads made from Marginella shells.

k - Two oyster shell pendants.

l - Two small triangular pendants. These seem to be made from the side walls of a univalve.

m - Bead made from a section of clay pipe stem, light buff in color and fired very hard. This stem has a flat side and is decorated with very faint rouletted marks which do not show very well in the photograph. The drawings (Fig. 1) show these features to better advantage.

n - A bead of soapstone, partly bored from both ends.

Drawing (Fig.2) - a gorget of dark purple slate. This specimen was mentioned in the Society's Proceeding No. 6, recently published, but was not illustrated.

Note: Correction, Proceeding No. 6 "The Hughes Site" - p. 10, "15th Annual Report of the Bureau of Ethnology" should read "20th Annual Report of the Bureau of American Ethnology".

Richard E. Stearns, Curator
Department of Archaeology.

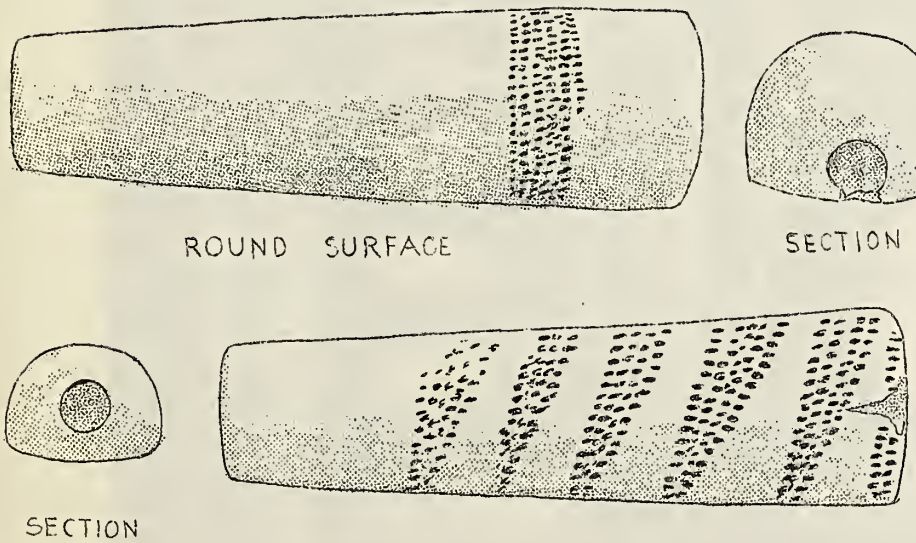
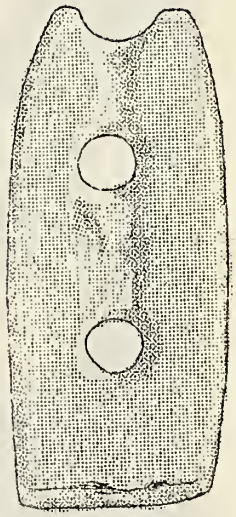
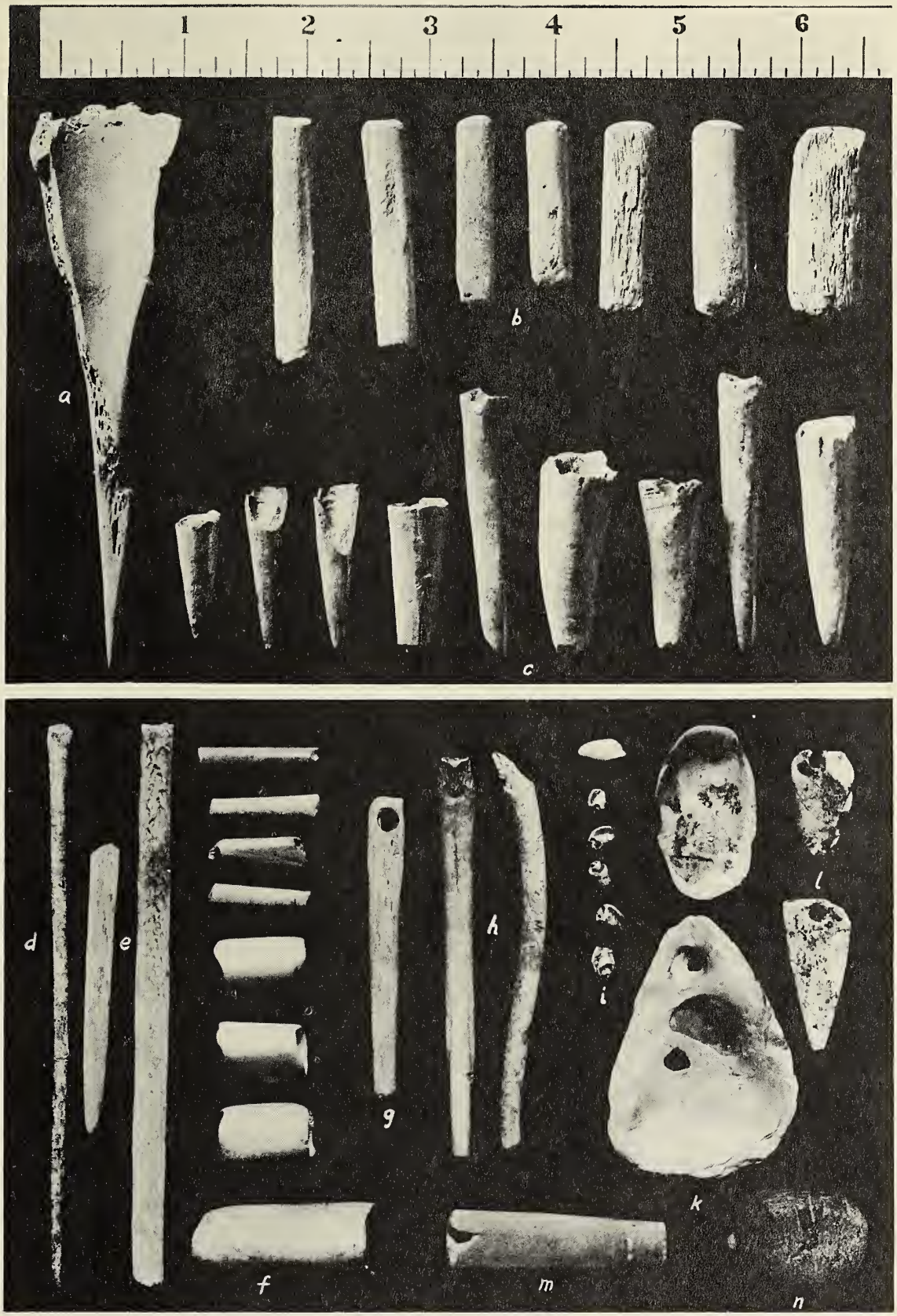


Fig. 1 X2 FLAT SURFACE



ACTUAL SIZE

Fig. 2



OBJECTS OF BONE, SHELL, CLAY AND STONE

Notes for Month of December

Meetings and Lectures at the Society

December 1 - Chess and Checker Tournament.

5 - Talk by Mr. Henri Seibert, "Quantitative Biology."

12 - Lecture by Dr. F. W. Bosley, "Maryland Forests."

19 - Talk by Mr. Edward Crosby, "How to Make the Most of Your Negatives."

Junior Division

December 2 - Lecture by Mr. Irving E. Hampe, "Bats."

9 - Talk by Mr. William Moorefield, "Nature in Relation to Mythology."

16 - General Discussion.

23 - Christmas Assembly.

Exhibitions, Lectures and School Loans

December 1 - Lecture by Mr. Elias Cohen, "Some Facts about Maryland Snakes " - Isaac Walton Club, Silver Springs, Maryland.

2 - Sparrows Point High School - loan of Birds, Insects and Habitat Groups.

15 - Baltimore Museum of Art - loan of Birds.

15 - Lecture by Mr. Elra M. Palmer, "Snakes of Maryland "- Clifton Park Jr. High School Assembly.

15 - Lecture by Mr. Edmund B. Fladung, "Care and Feeding of our Winter Birds " - Clifton Park Jr. High School Assembly.

15 - Lecture by Mr. Edmund B. Fladung, "Interesting Facts about Maryland Birds" - Myrtle Club.

The Natural History *Society of Maryland*

BULLETIN

Volume X FEBRUARY, 1940 Number 6

SOME LARGE BEETLES OF MARYLAND

By Herbert H. Moorefield

The Beetles, Order Coleoptera, are the largest group of all the insects. Over 250,000 species of beetles have been named and described, and more than 20,000 species have been recorded north of Mexico. In size, they range from microscopic specimens to the Giant Goliath Beetle, Goliathus giganteus Lam., found in the deep interior of French Equatorial Africa, which measures six and a half inches overall, and has a wing expanse of eight and a half inches. They present myriads of shapes, many of which are very unique and grotesque, while in colors they range through the entire rainbow.

Beetles can be readily distinguished from other insects by their thick fore wings which meet in a straight line along the middle of their backs, and form a protective covering over their soft,membranous hind wings. These "wing covers" are known as elytra.

Members of this order undergo a complete metamorphosis and the beetle larvae are commonly known as grubs. Much of the economic damage caused by beetles occurs in the larval stage.

The habits of both larvae and adults are greatly varied. Many are terrestrial, some are aquatic; many fly, and in some species the wings are undeveloped. Beetles feed on vegetable matter, including living plants, dead wood, and decayed substances; also, many are predacious, feeding on other living animals; others are scavengers eating only dead and decaying meat. From our standpoint, many species are extremely beneficial to mankind, while others are exceedingly obnoxious.

Following is a short account of some of the larger beetles that are likely to be encountered by the casual naturalist within the confines of our State.

Calosoma scrutator Fab. The "Searcher" is one of the

Plate I

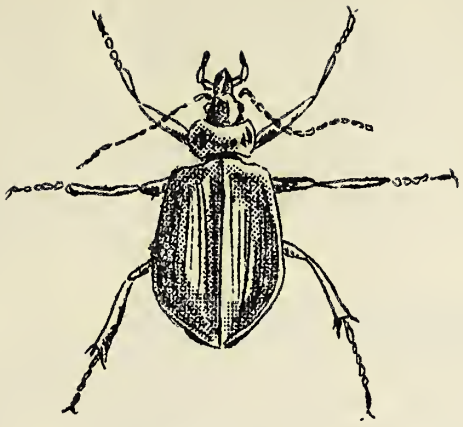


Fig. 1
The Searcher
(Calosama scrutator)

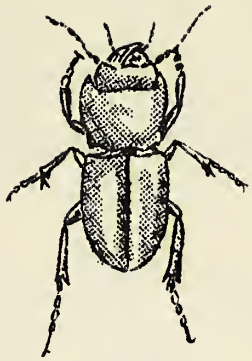


Fig. 2
A Ground Beetle
(Pasimachus depressus)

Fig. 3
The Eyed Elater
(Alaus oculatus)

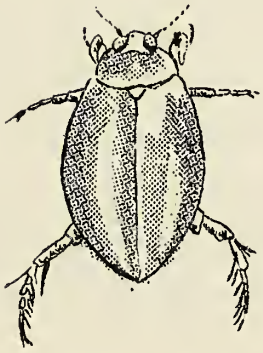


Fig. 4
Predacious Diving Beetle
(Cybister fimbriolatus)

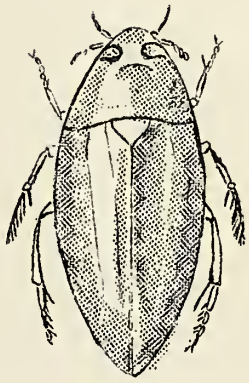


Fig. 5
Water Scavenger Beetle
(Hydrous triangularis)

(All Natural Size)

largest and most handsome of the ground beetles found in this State. It is easily recognized by its green wing covers. It is very speedy and difficult to catch, and it gives off a disagreeable odor when handled. The natural habitat of this beetle is beneath stones and logs in woods and near the borders of cultivated fields, although it is often attracted to the bright city lights and found in the streets. This species is predacious, and there are many records where the beetle has actually climbed trees in search of caterpillars. It feeds on many injurious larvae and is sometimes known as the "Caterpillar hunter". (Length 28-30 mm.) Figure 1.

Pasimachus depressus Fab. This is another large member of the ground beetle family. It is not seen quite as often as the foregoing species and is not frequent enough to rate a common name. It prefers sandy spots in the open woods and fields, and generally hides beneath stones and logs. It is classed among the most beneficial of the ground beetles, as its diet consists mainly of economically important larvae, especially those of the army worm.

P. depressus is a broad black species, usually bordered in blue, and is armed with a pair of heavy mandibles. (Length 24-30 mm.) Figure 2.

Alaus oculatus (L.). This species is well known and has many common names such as the "Eyed Elater, Giant Click Beetle, Spring Beetle, Snapping Bug, Skipjack", and the larva is known as a "Wireworm". The two large, velvety spots on the thorax closely resembling eyes are merely a part of the color pattern, and its true eyes are situated on the front of the head near the base of the antennae. The adults usually begin to appear in April, and are found beneath the bark of decaying logs and stumps in dry, open woodlands, and in abundance in the trunks of old apple trees.

Being able to spring up in the air when placed on their backs is a characteristic of the click beetles. This is made possible by a spine on the under surface that is drawn back over a cavity, and at the same time raising the tip of the elytra off the ground. Then, by suddenly relaxing the muscles, the spine descends into the cavity with a great force that causes the elytra to strike the surface on which the beetle is resting, and the insect is propelled into the air often one and a half to two feet high. Thus, after one or two attempts it is almost certain of landing in its natural position on its feet.

The length of different individuals of this species varies a great deal and some are twice as large as others, although they usually range between 28 and 45 mm. The larvae when nearly full grown are about 65 mm. or two and one half inches in length. Figure 3.

Cybister fimbriolatus (Say). The "Predacious Diving Beetle" is often seen floating near the surface of small quiet ponds. It rests in an inclined position, head downward, with the tip of the abdomen projecting from the water to take in a supply of fresh air which enables it to dive beneath the water. It is very cannabalistic and eats not only insects, but has been observed to attack small fish and other animals much larger than itself.

Plate II

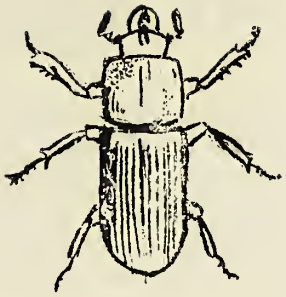


Fig. 7
The Passalus Beetle
(Passalus cornutus)

Fig. 8
Darkling Beetle
(Alobates pennsylvanica)

The Broad Necked Prionid
(Prionus laticollis)

Fig. 9

Fig. 6
The Stag Beetle
(Pseudolucanus capreolus)

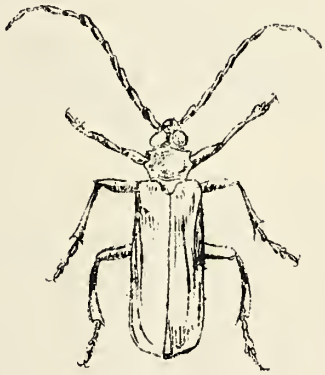


Fig. 10
The Straight Neck Prionid
(Derobrachus brunneus)

(All natural size)

The female deposits her eggs singly in aquatic plants and the young beetles that hatch are known as "Water Tigers" because of their voraciousness. When the larva has obtained its full size, it leaves the water, and makes a cell in the ground where it transforms into a pupa. It remains in this stage over winter and emerges the following year a full grown beetle.

The long filiform or thread-like antennae distinguish it from the other families of water beetles and its general shape is elongate-oval or egg-shaped. It is of a dark brown hue with a faint greenish tinge and has a yellow margin around the thorax and elytra. The bright lights often attract this species to the city, and the beetles are known to migrate from one pond to another. (Length 30-33 mm.) Figure 4.

Hydrous triangularis (Say). This species is known as a "Water Scavenger Beetle", and is supposed to feed on decaying vegetation, although its larva is carnivorus and eats living insects. It is distinguished from the preceding beetle by its oval body and clubbed antennae. The Water Scavenger Beetle has both its middle and hind legs elongated, and swims by stroking them alternately; the Predacious Diving Beetle has only the hind legs elongate and uses a swimming motion similar to that of a frog. The Scavenger carries its air supply in a film on the lower surface of the body, which gives it a silvery appearance from below; the Diving Beetle carries its air reserve on the top of its abdomen in a reservoir formed by lifting its wing covers a slight bit.

The eggs are encased in a sac of silk-like material excreted by the female. This is either attached to a water plant or carried about until the young hatch. Sometimes the case is allowed to float free in the water. The pupal stage is undergone in an earthen cell on dry land. H. triangularis has been recorded to have been attracted to electric lights in swarms of a thousand or more. (Length 34-37 mm.) Figure 5.

Pseudolucanus capreolus (L.). This species is known as the "Stag Beetle or Pinching Bug". It can be easily recognized by its large mandibles or jaws which are quite capable of inflicting a severe pinch when the beetle is carelessly handled. The adult beetles abound in rotten logs and decaying stumps. They are night fliers and emit a loud noise as they fly.

The eggs are laid in the crevices of bark, near the roots. The larva, a large whitish grub can be found in trunks or roots of partly decayed willow, cherry, oak, and beech trees. The adults emerge in May and June and can be found at the roots of these trees or picked up around the bright city lights a little later in the season. The female may be easily distinguished from the male as it has much smaller mandibles. (Length 22-35 mm.) Figure 6.

Passalus cornutus Fab. The well known "Passalus, Horn, or Bess Beetle" is probably familiar to all, as it is very abundant throughout the State. It is a large, shining black beetle, with a small curved horn situated on the top of the head. Country children often utilize them as toys, as they are very energetic and will willingly pull about all sorts of little objects tied to their horn with a strong piece of thread. The beetles and their larvae are

Plate III

Fig.11
The Tumble-Bug
(Pinotus carolinus)

Fig. 12
The Small Rhinoceros Beetle
(Xyloryctes satyrus)

Fig. 13
The Rhinoceros Beetle
(Dynastes tityrus)

Fig. 14
The Grape Vine Beetle
(Pelidnota punctata)

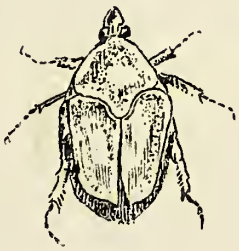


Fig. 15
The June Beetle
(Cotinis nitida)

(All natural size)

found occurring in colonies in partly decayed stumps and logs. They emit a creaking noise that is produced by rubbing the abdomen against the insides of the hard tough wing covers. The larvae present the appearance of having only four legs as the hind ones are exceedingly small. (Length 32-36 mm.) Figure 7.

Alobates pennsylvanica (DeG.). The "Darkling Beetles", so named from their dull black color, generally occur beneath bark and are not usually encountered unless one is looking for them. They present a peculiar loose-jointed appearance due to their long, awkward legs and are very clumsy in their movements. They often congregate in large numbers under a single piece of bark, and are found in the adult stage all winter.

The larvae resemble the wireworms, being long and slender, and are of a hard, horny texture. Their main diet is dead and decaying wood, fungi, and dry vegetable matter that is partly decomposed. (Length 20-23 mm.) Figure 8.

Prionus laticollis (Drury). The "Broad Necked Prionid" is a broad, stout bodied, black beetle with large heavy antennae. It is a member of the Long Horn family of beetles and is a slow moving insect, being most active in the evening when it laboriously flies about. The female is larger than the male. The larva, a large fleshy grub, is said to injure the grape, apple, poplar, and pine by boring into the roots. (Length 22-47 mm.) Figure 9.

Derobrachus brunneus (Forst.). The "Straight Bodied Prionid", another member of the Long Horns, is very closely related to the preceding species. It is colored a uniform, light chestnut brown and the sides of its body are parallel, which suggest its common name. Its general habits are similar to those of the Broad Necked Prionid. The adult is attracted to lights and often enters the houses to get closer to them. The larvae supposedly infest pine. (Length 22-40 mm.) Figure 10.

Pinotus carolinus (L.). The "Tumble-Bug", a typical Scarab, is probably one of the most noted of all the beetles. Its habit of rolling dung into balls has attracted attention for many generations. Scarab Beetles were considered sacred by the ancient Egyptians and were placed in the tombs of the dead, and their pictures and images were carved in all sorts of stone and precious gems.

They often work together in pairs on the same ball. Early observers believed them to be male and female working together to provide for their offspring, but after they were dissected and further studied, they were found often to be of the same sex. As soon as one becomes the least "trusting", his partner will steal the ball and roll it away for himself.

This species does not transport its dung ball any great distance, as do some species, but usually buries it near the spot on which it is constructed. It usually buries itself with the ball and greedily devours it, or lays an egg on it. In the latter case, it will provide food for the coming larva which, when full grown, transforms within the cavity in which the ball was placed. (Length 20-28 mm.) Figure 11.

Xyloryctes satyrus (Fab.). This is a large, brown beetle, with a long, curved, upright horn arising from the middle of the head of the male, whence the name "Rhinoceros Beetle". To avoid confusion with the following species, which is also known by the same common name, I have designated this as the "Small Rhinoceros Beetle".

It occurs sparingly throughout the State in the vicinity of ash trees. The larvae are said to be injurious to these trees as they feed upon the roots. (Length 25-28 mm.) Figure 12.

Dynastes tityrus (L.). This is the largest species of beetle occurring in the State of Maryland. The "Rhinoceros or Unicorn" beetle gets its name from the prominent horn of the male. The female has only a small tubercle in place of the horn. It is a greenish gray color, and has scattered black spots of extremely variable pattern on the wing covers. The larval stage of this beetle is passed in old rotten wood. (Length 40-50 mm.) Figure 13.

There occurs in the West Indies, a closely allied species of Rhinoceros Beetle, Dynastes hercules, which measures 150 mm. in length.

Pelidnota punctata (L.). This yellowish-brown insect is known as the "Grape Vine Beetle" from its habit of feeding on wild and cultivated grapes. It is characterized by three black spots on each wing cover and one on each side of its thorax. The adult is usually found on its favorite food plant or flying about in the near vicinity. The larva is found in stumps and decaying roots of various trees upon which it feeds. (Length 20-25 mm.) Figure 14.

Cotinis nitida (L.). The "June Beetle or Fig-Eater" as it is often called is of a dull velvety green color above, and metallic green or reddish-yellow beneath. At night, it often flies about in great numbers, making a loud buzzing noise similar to the May Beetles.

The larva injures growing vegetation by feeding on the roots of grass, strawberries, and other plants. Vegetable molds are also a part of its diet, and it has a troublesome habit of turning up little mounds of soil around the bases of flowers that takesthe dirt away from the roots. This habit is also a problem on golf courses and private lawns. The legs of the larva are very short and when it crawls about, it moves upon its back. (Length 20-23 mm.) Figure 15.

Note: These beetles are all represented in the insect collection of this Society. The illustrations for this article were drawn from the actual specimens by Mr. Joseph Bures, of the Bulletin Staff. They are all natural size.

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Blatchley, W.S. (1910) "An Illustrated Catalogue of the Coleoptera or Beetles Known to Occur in Indiana".
Comstock, John H. (1925) "An Introduction to Entomology".

Leng, Charles W. (1920) "Catalogue of the Coleoptera of America, North of Mexico".

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KNOW YOUR MUSEUM

The order Columbiformes or doves is represented by one species and that is the Mourning Dove.

At one time this order included the Passenger Pigeon now extinct, but when the last Passenger Pigeon died in the Cincinnati Zoo in September,1914, the Mourning Dove became the only representative species of this order in our State.

The Mourning Dove is considered a permanent resident of Maryland. It is a beautiful bird with delicate coloring.

It nests around the first of April, building a very loose platform of crossed twigs; in fact the structure is so loosely constructed, that one is surprised that eggs or young ever survive. Often the eggs can be seen through the bottom of the nest.

The nest is generally built in the crotch of a tree and rather low from the ground. The writer has seen nests balanced on an outstanding limb of a tree, and one was built on a log, one foot from the ground. Upon this loose structure two white eggs were laid.

The birds generally raise at least two broods a year. This is absolutely necessary if the species is to survive, for besides its many natural enemies and the unsparing elements, it has man, the hunter, as its worst enemy.

The bag limit on these birds is fifteen to each hunter per day and there are seventy-six open days in the year. Unless some unforeseen disease attacks it, the bird can survive under these conditions, but if such did occur it is very possible that it would meet the same fate of the Passenger Pigeon. That the mortality in this bird is high is beyond doubt.

Time and time again the writer has found a nest rifled of both eggs and young, the day following a visit to the nest.

In Case No. 19 at our Museum a specimen of this bird can be seen.

E. B. Fladung

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Field and Laboratory Notes

Barn Owl

The Barn Owl (Tyto alba pratincola) is one of the most beneficial of our owls. The stomach contents of one of our speci-

mens show the type of food usually taken by this species. The material, checked by the Biological Survey, consisted of the following:

1 Meadow Mouse (Microtus pennsylvanicus)
1 Other undetermined Microtinae (young individual)
1 White-footed Mouse (Peromyscus sp.)
1 Little Shrew (Cryptotis parva)

The owl was found dead at Beaver Dam Churches on November 26, 1939 by Herbert Moorefield.

Irving E. Hampe

Red Bat

On Sunday, December 17, 1939, I observed a Red Bat flying about in Patapsco State Park at Glenartney, Maryland. It was observed clearly for at least ten minutes as it hawked about in the sunlight. This is only the second time I have observed the species in this area. The first record was of a specimen taken in 1937 (Bulletin N.H.S. of Md., Vol. X, No. 1).

Irving E. Hampe

An Unusual Winter Bird

During my winter trips to the Patapsco State Park I have searched for the Hermit Thrush. This species has been recorded from numerous localities as occasionally wintering. On January 1, 1940 I saw my first wintering Hermit Thrush near Avalon, Maryland. It allowed a close approach and when flushed flew only a short distance. It was observed eating the berries of the Black Gum. Through the binoculars I saw the thrush ejecting the seeds.

Irving E. Hampe

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Notes for Month of January

Meetings and Lectures at the Society

January 9 - General Assembly.

16 - Lecture by Mr. Howard B. Owens, "Amic - Beavers in General; Beavers in Maryland in Particular."

23 - Talk by Mr. Edmund B. Fladung, "Importance of a Natural History Museum to a Community."

30 - Talk by Mr. Wilmer V. Bell, "The Periodic Table, a Valuable Tool to the Scientist."

Junior Division

January 6 - Lecture by Mr. Charles Ostrander, "A Brief Survey of Rocks and Minerals of Maryland."

13 - Talk by Miss Helen Klinke, "Our Cabin at Union Dam."

20 - Seminar - "The Origin of the Earth."

27 - Talk by Miss Janet Byrns, "The Snake Men of Africa." Motion Pictures, "Conservation of Trout."

Exhibitions, Lectures and School Loans

January 8 - Forest Park Junior High School, Class 10 - Talk by William Norman, "Snakes, Turtles and Lizards of Maryland."

8 - Forest Park Junior High School, Class 9 - Talk by William Norman, "Snakes, Turtles and Lizards of Maryland."

11 - Campers Elementary School, Towson - Loan of Birds.

13 - Boy and Girl Scouts of Betterton, Maryland - Lecture by Mr. Howard B. Owens, "Amic - Beavers in General; Beavers in Maryland in Particular."

20 - Curtis Bay School - Loan of Flicker Group.

27 - Eastern High School - Loan of Fish.

29 - Bonwit-Lennon, Inc. - Loan of Birds.

30 - Girl Scouts Troop, Govans M. E. Church - Lecture by John and William Norman, "Some Snakes of Maryland."

31 - Gilman Country School - Lecture by Mr. Herbert C. Moore, "Natural History and Other Hobbies."

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The Natural History Society of Maryland

BULLETIN

Volume X MARCH, 1940 Number 7

THE FAMILY ICTERIDAE IN MARYLAND

By C. Haven Kolb, Jr.

The purposes of this article are three: to discuss the distribution of a group of birds which are very conspicuous and of considerable popular interest, to extend the survey of our present knowledge of certain important families, a task begun a number of years ago with Mr. Hampe's article on the Compsothlypidae (see Bull. Nat. Hist. Soc. Md., 4:37-41), and to indicate the gaps in our ornithological knowledge of Maryland as illustrated by this one family. The data given will be of use in the Department of Ornithology in the preliminary work on the Maryland check-list which is now being actively forwarded. Use has been made of the chief published sources, but there has been no attempt to include all published material. Supplementing this, the records of the extensive observations of the Staff of the Department of Ornithology and Mammalogy have been utilized as well as the records contributed to our files by several cooperators in various parts of the State.

The family Icteridae is distinctively American and is usually regarded as closely allied to the Fringillidae or sparrow group. The family has its center of abundance in the tropics where most of the one hundred and fifty odd species are resident. It is a very variable family in regard to habits, voice, and food, but the tendency toward gregariousness is strong. There is no good English family name. Blackbirds and orioles are included but the original European birds from which these names come belong to two quite different families.

Not only are our representatives of this family conspicuous and well known birds but they are also of considerable economic interest from both beneficial and destructive points of view. Not all the following records are based upon captured specimens, since these birds are readily identified and only competent observers have been consulted.

The following species are known to occur in Maryland:

1. Dolichonyx oryzivorus - Bobolink

This is a bird which has apparently decreased in numbers. In the last decade of the last century Kirkwood (1895) listed them as a common migrant in spring and fall. He says, "Usually observed in the uplands in spring, they are also numerous there in the fall, while the marshes are alive with them." This was for the vicinity of Baltimore. We have records only from Dorchester and Talbot counties on the Eastern Shore (Jackson). On the western shore we have records from the vicinity of Washington and from Calvert, Anne Arundel, Baltimore, Carroll, Allegany, and Garrett Counties.

For the state east of the mountains, the earliest date is April 25 (1911) at Cambridge (Jackson) and the last in spring is May 26 (1895) from the Baltimore area (Kirkwood). The earliest in fall is August 9 (1894) near Baltimore (Kirkwood) and the latest is November 11 (1888) (Resler). Dates given for Washington, D.C. by Cooke (1929) are in substantial agreement but cannot be used directly since we cannot at present differentiate Virginia from Maryland records in her list. Most of the dates in recent years have been for the spring migration.

Preble (1900), found a pair at Grantsville, Garrett County, on June 23 (1900), but gives no direct evidence of breeding. However, Brooks (1936) says that singing birds are noted regularly in the southwestern section of the county and reports that Dr. Ivan Fawcett found a nest with eggs at Red House on June 20, 1932.

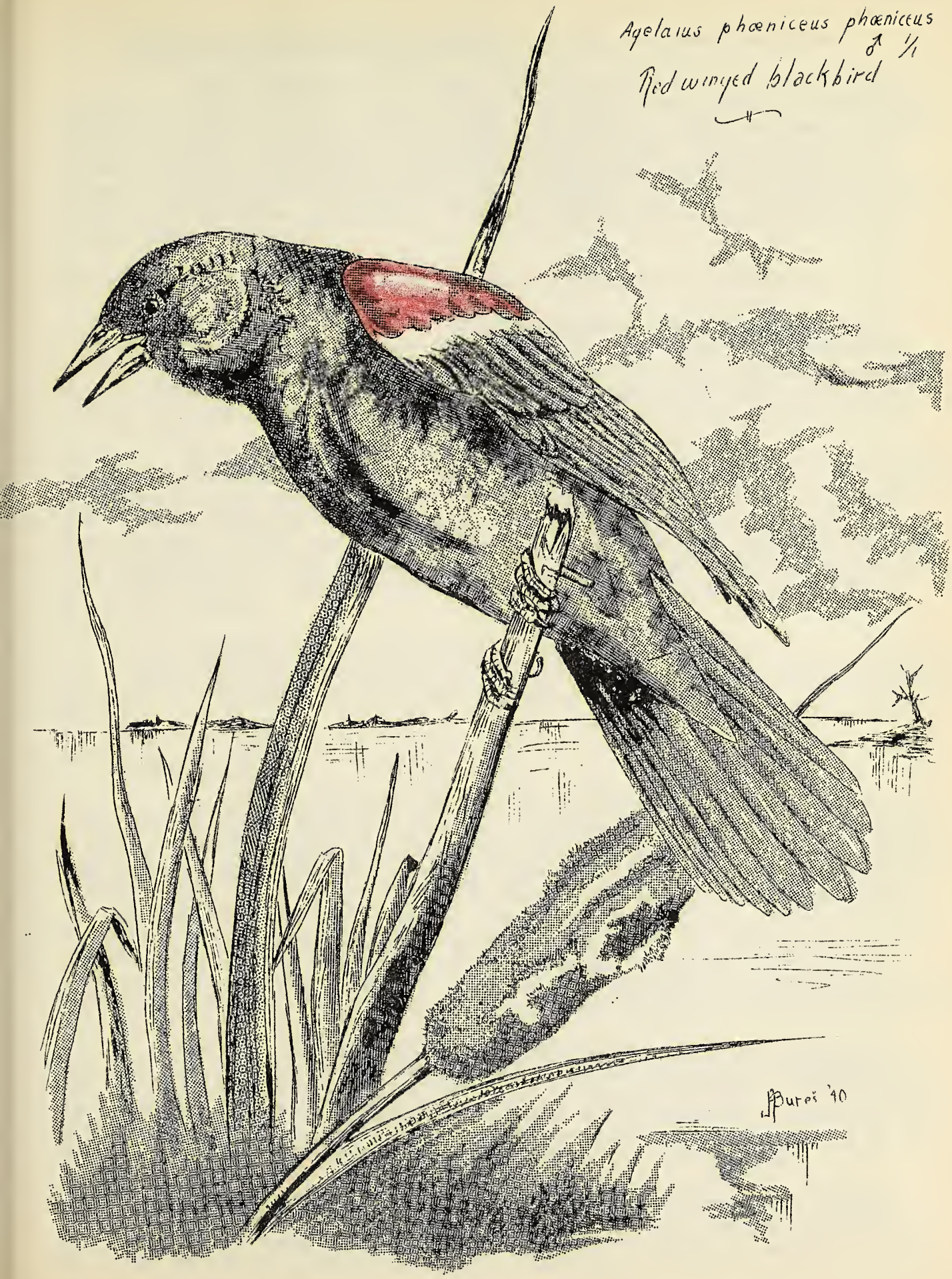
2. Sturnella magna magna - Meadowlark

The Meadowlark seems to be well distributed throughout the state.

Besides the vicinity of Washington and Baltimore we have records from the following counties: Worcester, Wicomico, Dorchester, Prince Georges, Charles, Calvert, Anne Arundel, Baltimore, Howard, Harford, Carroll, Allegany and Garrett.

This is one of the hardiest species in its family. Brooks (1936) reports that it can be found as a rare bird in winter even in Garrett County, but Eifrig (1902) in the vicinity of Cumberland has dates ranging only from March 1 (1902) to October 23 (1901). About Baltimore the majority of dates lie between the first of April and the last of October. In severe winters many move from the uplands down to the milder land along the Bay. At Loch Raven they can be seen occasionally in December, and there is a record for January 29, 1939. This is an exceptionally exposed location.

The species is very common wherever there are open fields. Jackson has sent us a long series of nesting records from Cambridge. These range from May 13 (1917) to August 9 (1920). In the vicinity of Baltimore fresh eggs (incomplete set) were found on May 10, 1891 and five fresh eggs as late as July 21, (Kirkwood), indicating little difference in breeding season between the eastern and western shores. Eifrig (1904) records two complete sets of eggs on May 21, 1903.


Agelaius phœniceus phœniceus
♂ 1/1
Red winged blackbird
Burns '10

3. Xanthocephalus xanthocephalus - Yellow-headed Blackbird

Four specimens of this western species have been taken. Three of these were in the vicinity of Baltimore, one at Washington. All were taken in the fall in tidal marshes. Only one was a male. The dates are: September 10, 1891, male, Curtis Bay; August 29, 1892, female, Washington; September 18, 1893, female, Patapsco Marsh, Baltimore; October 1, 1894, female, also at Patapsco March. So far as we know the species has not been recorded in Maryland since that time.

4. Agelaius phoeniceus phoeniceus - Red-winged Blackbird

The distribution of this species is undoubtedly state wide. We have records from the District of Columbia, Baltimore City, and the following counties: Dorchester, Queen Annes, Talbot, Kent, Cecil, Charles, Calvert, Prince Georges, Anne Arundel, Baltimore, Harford, Howard, Carroll, Frederick, Allegany and Garrett.

In western Maryland Brooks says, "I have no winter records." Eifrig's earliest date was March 14. About Baltimore the migration begins in February and large flocks are observed during the next two months. The fall migration lasts from September through November. A few winter in the uplands (the same is reported by Cooke for Washington), but along the Bay they are fairly common throughout the winter. Hampe found large flocks migrating from August 19 to 22, 1936.

Breeding is comparatively late for a species which arrives so early. The earliest date is May 10 for the Eastern Shore (Jackson) at Cambridge, and for the vicinity of Baltimore May 18 (Kirkwood).

5. Icterus spurius - Orchard Oriole

The Orchard Oriole seems to be more common than the Baltimore Oriole which appeals so much to the popular mind. However for Garrett County Brooks says that the latter is generally more common, and Eifrig says that the Orchard Oriole is "nearly absent from the higher parts in summer." Preble makes no mention of the present species in the mountains, while recording several instances of the occurrence of I. galbula. We have records from the District of Columbia, Baltimore City, and the following counties: Dorchester, Queen Annes, Calvert, Prince Georges, Anne Arundel, Baltimore, Howard, Harford, Carroll, Montgomery, Washington, Allegany, and Garrett.

The orioles are among the later migrants. At Cambridge on the Eastern Shore the earliest date is April 20 (1916) (Jackson) and this is the earliest for the state. The earliest at Washington is April 25 (Richmond, in Kirkwood) while at Baltimore none has been noted before May 5 (1895). The only western record of interest is one at Hagerstown on April 30, 1879 (Small, in Kirkwood).

Jackson reports numerous nestings at Cambridge, ranging from May 20 (1916) to June 6 (1920). Eaton has noted a nesting at New Windsor in Carroll County on the Western Shore as early as May 23, 1935 and Kolb found the species breeding at Loch Raven, Baltimore

County, as late as June 25, 1938.

6. Icterus galbula - Baltimore Oriole

Our records for this species in recent years are few. This seems odd for so conspicuous a bird and suggests something more than local scarcity. Kirkwood called them "locally common". At Washington, D.C. Cooke calls it a "rare summer resident" agreeing with our Baltimore observers that I. spurius is the commoner species in summer. We have records from only nine counties (in addition to the District of Columbia and Baltimore City): Dorchester, Prince Georges, Baltimore, Harford, Howard, Carroll, Washington, Allegany and Garrett.

The earliest record we have is April 24 (1917) at Cambridge (Jackson) and the latest, in the vicinity of Baltimore, on October 6 (1894) (Kirkwood). Most records, however, run only into the first week of September. Cooke notes a specimen picked up dead on January 5, 1925 at Anacostia by C.H.M. Barrett. For the vicinity of Cumberland Eifrig gives April 27 (1902) as the earliest date.

Kirkwood reported the start of nest building on May 2 (1891) at Waverly, Baltimore. This nest was not finished until the fourteenth and all our egg dates are near the end of May and the beginning of June. The earliest specific record of eggs is May 18 at Hagerstown (Small, in Kirkwood). Kirkwood further reports young out of the nest still being fed on July 21 (1895).

7. Euphagus carolinus - Rusty Blackbird

Our records for this species are very scanty. Although it is rather common during migration we have definite records only from Baltimore City, the District of Columbia, and Kent, Baltimore, Howard, Allegany, and Garrett Counties.

For Western Maryland Brooks says, "Scattered individuals in the spring, and good sized flocks in the fall migration. I have no winter records," and Eifrig says,"never common." However, near tidewater in the vicinity of Baltimore they are common both spring and fall. Miss Cooke says "occasional in winter" for the Washington, D.C. region and Kirkwood notes "quite a number winter in tidewater Maryland."

It is obvious that we need a great deal more information concerning this species to be very definite about its status.

8. Quiscalus quiscula - Grackle

The birds treated here belong to two subspecies, possibly, according to recent discussion by Wetmore, to two distinct species. Most records do not distinguish between the two forms and we will discuss this question further below, presenting first records for the whole species. We have records from the following counties: Worcester, Dorchester, Queen Annes, Talbot, Kent, Charles, Calvert, Prince Georges, Anne Arundel, Baltimore, Harford, Howard, Carroll, Frederick, Allegany, and Garrett, as well as Baltimore City and the District of Columbia.

In Western Maryland the bird seems to be definitely a summer resident, Eifrig giving March 14 (1903) as the earliest and November 3 (1901) as the latest dates for the vicinity of Cumberland. In the uplands about Baltimore the species is not usually seen in winter although Hampe has a record for January 9 (1938) from western Baltimore. In the lowlands, near the tidal rivers, however, the birds are frequently found in winter, especially during mild ones. For the upland area dates range from February 21 (1937) to November 12 (1939).

Egg dates range from April 25 (1925) at Cambridge (Jackson) and May 6 (1892) in Baltimore County (Kirkwood) to June 8 (1884) (Kirkwood). Cooke records eggs in the Washington region on April 17 (1887), but it is not certain that this was north of the Potomac. However, at Towson nesting activities had begun, though no eggs were noted, on April 10 (1937) (Kolb).

The grackles in the eastern part of the state are predominantly Quisculus quiscula quiscula, the Purple Grackle. In the western part of the State the Bronzed Grackle (Q. q. aeneus) should probably be the breeding form. Nevertheless, wandering, both eastward and westward seems to be a common occurrence. Sight records of the two forms are rather doubtful and intergrades are frequently encountered when collecting is undertaken. Preble says that specimens taken at Bittinger, Garrett County, were intermediate between quiscula and aeneus. Eifrig found none of the western form (aeneus) about Cumberland. Hampe observed several individuals at Mountain Lake Park, Garrett County, and after long and careful scrutiny decided they were aeneus. In the east there are a few definite records of aeneus. The Smithsonian Report for 1886 lists specimens taken in Prince Georges County by Frederick Zeller and by George Marshall. Kirkwood took one March 1, 1895 in Dulaney Valley, Baltimore County. In the collection of the Society are two taken October 29, 1939 by John Gross at Towson and an intermediate taken by Seibert at Sykesville. Extensive collections of this species from all parts of the State would be very desirable.

9. Cassidix mexicanus major - Boat-tailed Grackle

This species is a southern one which is found on the Eastern Shore. There is a record for Pomona in Kent County published by Edgar Small in the "Ornithologist and Oologist" in 1883 (Vol. 8, p.76). Breeding colonies have been found in Worcester County near Ocean City. Kirkwood records two accidental occurrences in May, 1893: one in Baltimore with a flock of Quisculus on the sixth and one at North Point, Baltimore County on the seventeenth.

10. Molothrus ater ater - Cowbird

This species, well known as a nesting parasite, has been recorded from Baltimore City, the District of Columbia and the following counties: Dorchester, Talbot, Cecil, St. Mary's, Calvert, Prince Georges, Baltimore, Harford, Howard, Carroll, Allegany, and Garrett.

It is not known to spend the winter in Western Maryland nor in the uplands of the Piedmont Plateau, but near tidewater a few may be seen throughout the year. In the uplands north and west of

Baltimore this bird has been known to arrive as early as March 12 (1892) (Kirkwood). During the summer and fall it is not common in this vicinity. Kirkwood recorded it until November 19 (1894).

Eggs have been recorded as early as April 25 (1925) at Piney Point, St. Mary's County by Court and on April 30 (1920) at Cambridge by Jackson. Around Baltimore nesting is later, the earliest being May 21 (1893) (Kirkwood). Eggs have been found in the nests of several species of birds.

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TYPES OF ABRADING STONES USED BY MARYLAND INDIANS

By Richard E. Stearns

During the course of the writer's visits to numerous Indian village sites in Maryland many objects were found which are known as abrading stones. These objects are by no means confined to Maryland or to any other localized area but are generally distributed throughout the eastern United States.

There are several forms of abrading stones, each type evidently used for a different purpose and generally made of sandstone or greenstone. The distinguishing features of these stones are the grooves on their surfaces which seem to have been produced by grinding some other objects against them. A number of theories have been advanced as to the forming of these marks, but it is a difficult matter to say just what was ground, as the position and shape of some of these grooves make a satisfactory explanation almost impossible.

We have found three forms of abrading stones in Maryland, two of them widely known types because of their pronounced grooves, known as arrow shaft stones and sinew stones, and one type which seems not to have attracted much attention, illustrated in Figure 5 from Rocky Point, near Middle River, and Figure 6 from the Susquehanna River at Conowingo. At the present time we have found only one arrow shaft stone, which is illustrated in Figure 1. This is made of red sandstone and was found on the Magothy River, but it is not a very pronounced example of its type. It is thought that arrow shafts were ground into shape in the grooves, which have a semi-circular shaped cross section, but in this particular specimen one

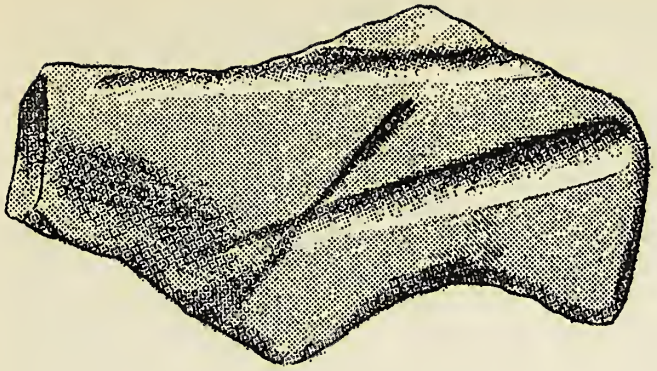


Fig. 1

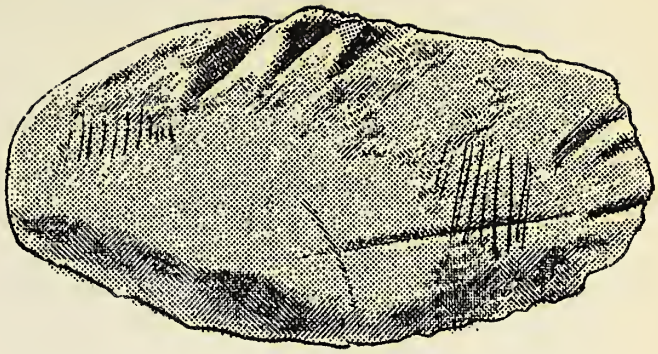


Fig. 2

Fig. 3

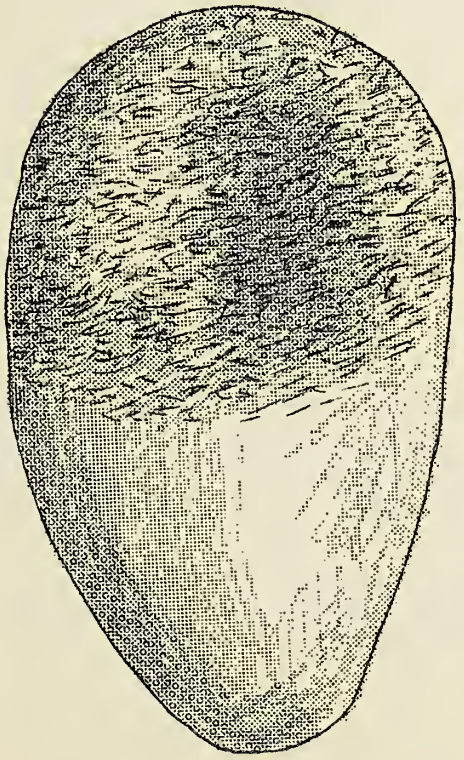


Fig. 5

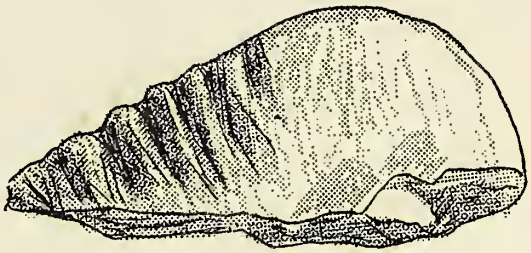


Fig 4

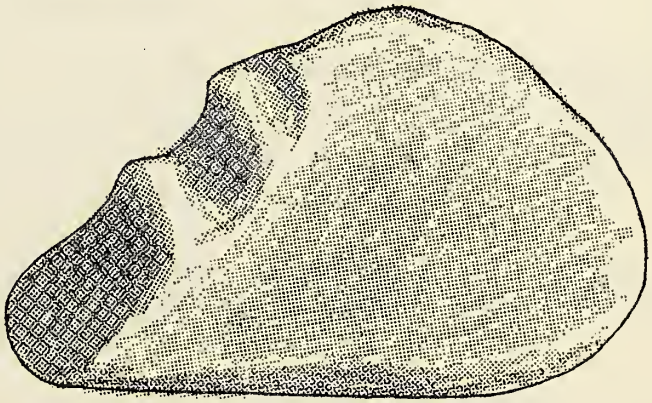
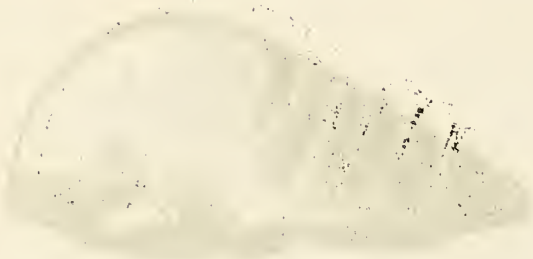


Fig 6

ABRADING STONES FROM VARIOUS INDIAN VILLAGE SITES IN MARYLAND - ACTUAL SIZE



of the grooves ends rather abruptly, suggesting that either the end of the arrow shaft or a bone awl was ground in this groove.

The features which suggest the name of the sinew stone - the second type - are a number of narrow sharp grooves radiating from the center to the margin of the stone which are thought to have been formed by pulling strands of sinew across the edge in some process connected with the manufacture of cords. We have three of these sinew stones in our collection, one from the Magothy River (Figure 3), one from Miles River (Figure 4) and one from Cecil County (Figure 2). It will be seen that an attempt has been made to bore a suspension hole in the specimen from the Magothy River, which was not completed due to its having been started too near the margin of the stone. The specimen from Miles River, of grayish green sandstone (Figure 4), is broken but shows very pronounced grooves. The specimen from Cecil County (Figure 2) differs from the others in that several sharp grooves cut directly across the edge of the stone without continuing on to the flat surface.

The grooves in these three sinew stones all show sharp striations, which to the writer, do not resemble marks made by the friction of such a soft substance as sinew, as there should be some suggestion of polish in the bottom of the grooves.

The third type which in this locality is the most common, is usually made from a flat greenstone pebble from four to six inches long and has a broad abraded surface on one end, rarely at both ends. The abraded surface seems to have been produced by striking the stone a glancing blow with a hammerstone and some specimens show a slight degree of polish or rubbing marks on top of the marks of the hammerstone. These stones were probably used as anvil stones. If they were used for sharpening stone or bone implements, it might have been found necessary to roughen the surface with a hammerstone whenever they became too smooth. These objects have been found by the writer on both the shell field sites and the sites along the fall line further to the westward.

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FIELD NOTES

On January 31, 1940, I observed an immature Herring Gull with colored celluloid bands on its legs. This bird was observed at the Fish Market on Market Place, Baltimore. The Gull Survey Committee of the Linnaean Society informs me that it was banded at Kent Island, N.B., Canada in a nestling in 1939.

Interested persons are requested to note the color and position of the bands and report to the above mentioned Committee, at the American Museum of Natural History, New York, N.Y.

Irving E. Hampe

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Notes for Month of February

Meetings and Lectures at the Society

February 6 - Talk by Mr. Irving E. Hampe, "Food Habits of Birds of Prey."

13 - Talk by Mr. George Maugans, "Hibernation of Reptiles."

20 - Lecture by Dr. J. Bently Glass, "Recent Advances in Controlled Evolution."

27 - Talk by Mr. Herbert C. Moore, "Science and Law."

Junior Division and Scout Troop

February 3 - Junior Division lecture by Mr. Clyde Reed, "Plants of Worcester County."

Junior Division talk by Carl Oertel, "Trip to Hawaii."

10 - Junior Division talk by Elias Cohen, "Animals in Shakespeare."

12 - Scout Troop Meeting. Lecture by Mr. Charles Ostrander, "Minerals in Maryland."

17 - Junior Division Seminar, "The Origin of Man in America."

19 - Scout Troop Meeting. Motion pictures.

24 - Junior Division talk by Elias Cohen, "Egg Laying Habits of Snakes."

24 - Junior Division talk by Romeo Mansueti, "Spring Amphibians."

26 - Scout Troop. Motion pictures.

Exhibitions, Lectures and School Loans

February 1 - To Biology Club, Eastern High School by Miss Janet Bryns, "Snake Men of Africa."

13 - To Baltimore City College - Loan of Birds.

20 to 24 - Lord Baltimore Hotel, Exhibit of Educational Work of Society.

21 - To State Teachers College - Lecture by Messrs. Howard B. Owens and Allan Bonwill, "Muskeg."

The Natural History Society of Maryland

BULLETIN

Volume X APRIL, 1940 Number 8

COLLECTING AND PRESERVING BOTANICAL SPECIMENS

By Earl H. Palmer

In making a collection of plants, we should do so with the idea of having material to study the year round. True, indeed, is the saying that the best place to study plants is in the field; but, unfortunately, the flowering plants are somewhat seasonal. Besides, collecting and preserving plants help one to know the various species better. Some botany students consider the making of a herbarium (a collection of dried plants) the end of their work. In reality, it is only the beginning; from it they have material to study, to compare with live plants, and to use as a source of reference. Therefore, the collecting and preserving of plants are to be encouraged, subject to the rules of conservation.

The collecting equipment to carry specimens consists of either the vasculum or the press. The vasculum is a light metal cylinder not more than 19 inches long, painted white on the outside, and equipped with a shoulder strap. The usual size is $4\frac{1}{2}$x$6\frac{1}{2}$x18 inches (see Fig. 1). The plant to be collected is gathered and placed in the vasculum without bending the specimen or taking time to arrange it. Plants may be kept fresh in a vasculum for a day's trip. Beyond that time they have a tendency to wilt. A wilted plant may be freshened sometimes by placing it in a bucket of water. I have a wooden box with a shoulder strap that I occasionally use as a vasculum. By placing several pieces of moss in the interior of this box, I am able to keep it moist, thus keeping the specimens from wilting.

The second type of equipment is the plant press. This press (Fig. 2) is usually 12x18 inches. It consists of two perforated boards, driers (newspapers can be used very successfully), blotters, and corrugated cardboard. When using the press in the field, the plants are placed in position and pressure is applied at once; there is no possibility of the specimen wilting. This second method of collecting has two disadvantages (1) it is somewhat cumbersome (2) the wind can play havoc with the driers and plants everytime the press is opened. However, I have used both methods in the field and

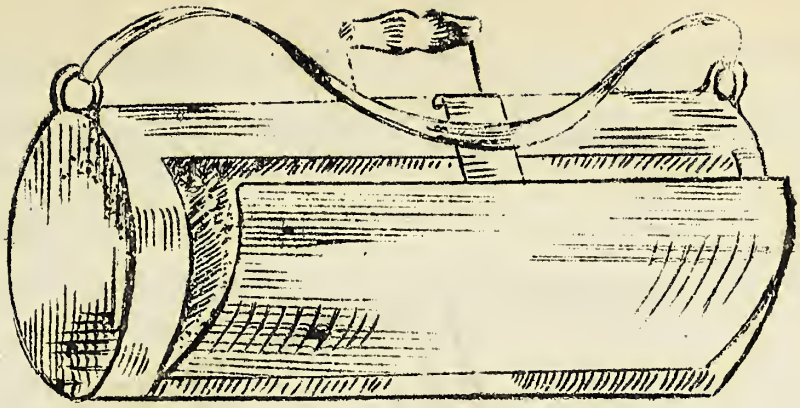


Fig. 1

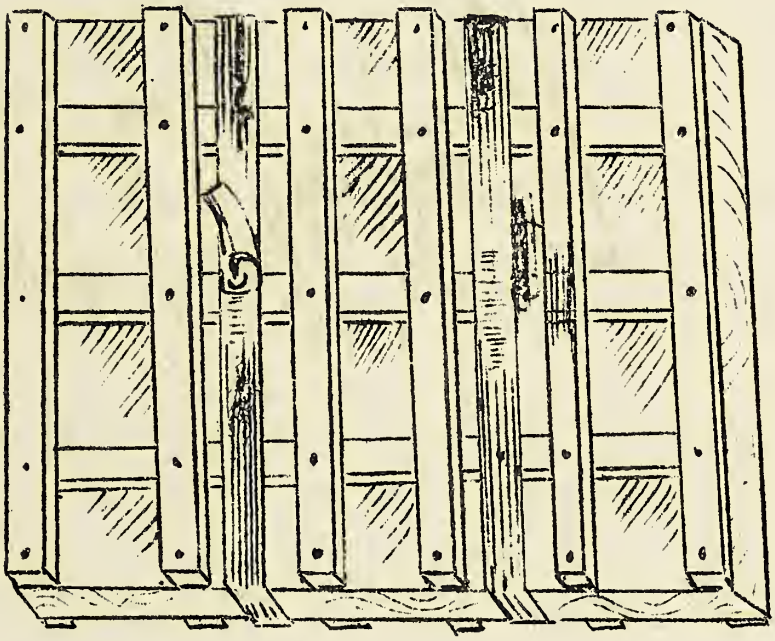


Fig. 2

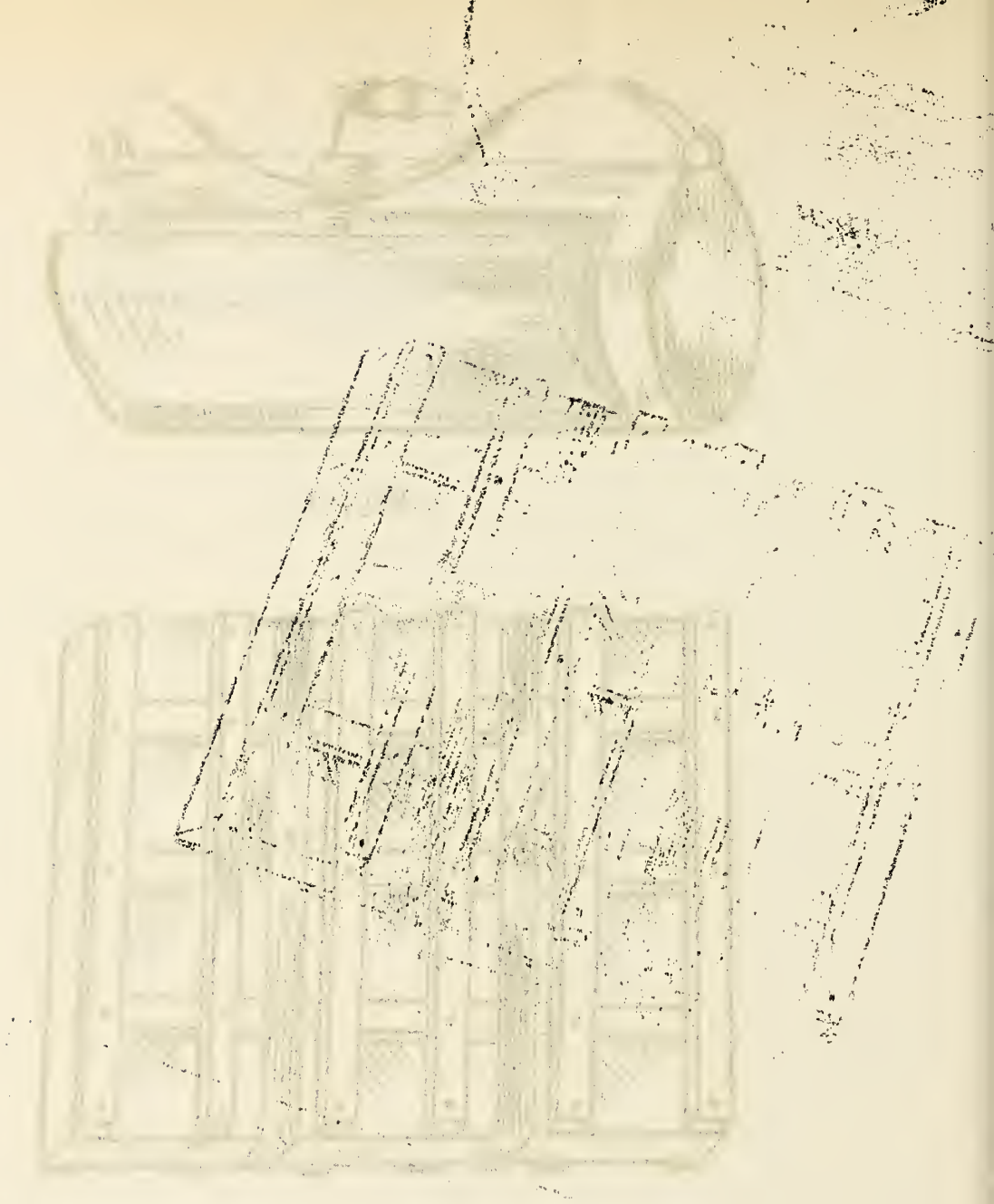
Collector Date
Name
Locality
Habitat

Soil

Sunlight

Moisture

Fig. 3



have obtained the best results by using the botanical press.

Every plant collected should have a field label attached. This slip of paper should have all the following information:

(1) date collected

(2) locality where the plant was found (give the nearest town, village or name of the area)

(3) habitat of the plant (this should include the type of soil - i.e., sand, gravel, loam, mud, crevices of rocks, etc.; direct or indirect sunlight; amount of moisture, - wet, damp, dry; whether the plant grows on a hillside, valley, swamp, flood plain, deep woods, or in an open field, or road side)

(4) name of the plant (either determined at the time it was taken or at a later date)

(5) name of the collector

(6) number (these numbers should run consecutively)

The labels should be prepared ahead of time and run off on a ditto or mimeograph machine, thus assuring a large enough supply. The type of field label that I use is shown in Fig. 3.

As to the actual collecting of plants, let us assume there are several plants growing together and we dig up one. A trowel may be used for this purpose, but from personal experience I have found that my fingers are the best. Once the soil is loosened by a knife or a stick I use my fingers to get down to the roots; in this manner the rootlets are not injured. If water is near at hand, all dirt should be washed off; lacking water, much of the soil can be shaken or knocked off, care being taken not to break the root from the rest of the plant. A label is filled out and placed with the specimen. If a vasculum is used, the label may be pinned around the plant (Fig. 4); if the press is used the label may be placed on the sheet with the plant.

Seeds, nuts, fruits, bark, twigs, and other dry characteristic parts are placed in envelopes bearing the same number as the label. All pulpy fruits should be preserved in formalin diluted with 5 to 10 parts of water.

Specimens of wood should likewise be taken where necessary. These should be given the same number as the corresponding label on the other parts collected. Naturally, the woods have to be seasoned. Do not collect wood over 8 inches long (I have found 6 inches sufficient) and be sure that the bark is characteristic of the plant. After the specimen has been seasoned, it may be cut as shown in Fig. 5.

The botanical press is the ultimate place where plants are placed for drying. The press as shown in Fig. 2 consists of two perforated boards. The purpose of the boards is to give a firm backing to the driers and, at the same time, to allow the free cir-

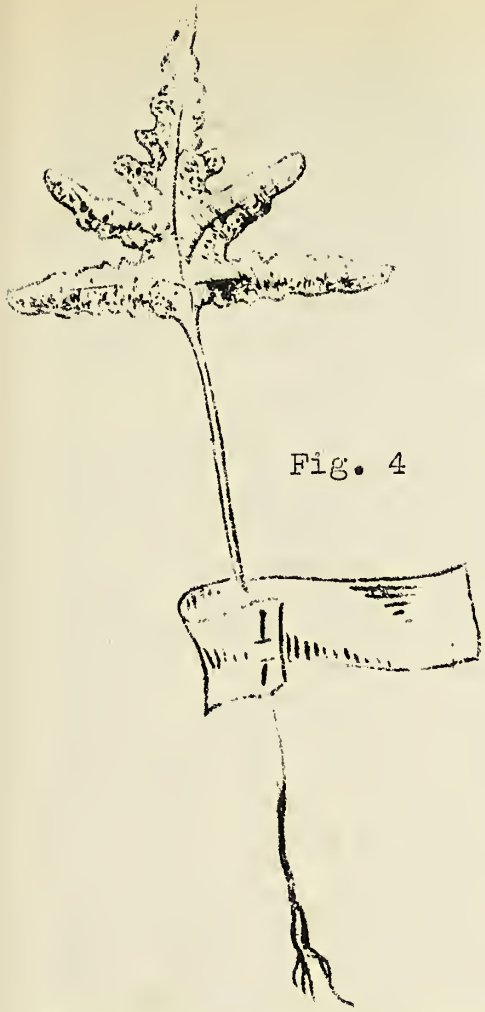


Fig. 4

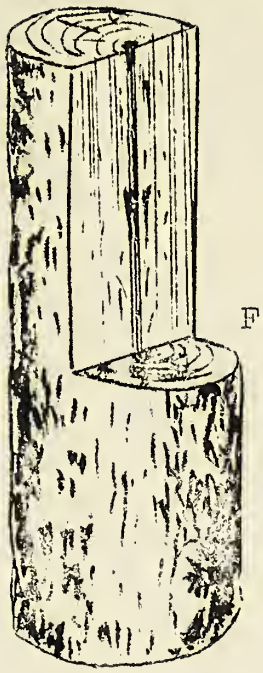
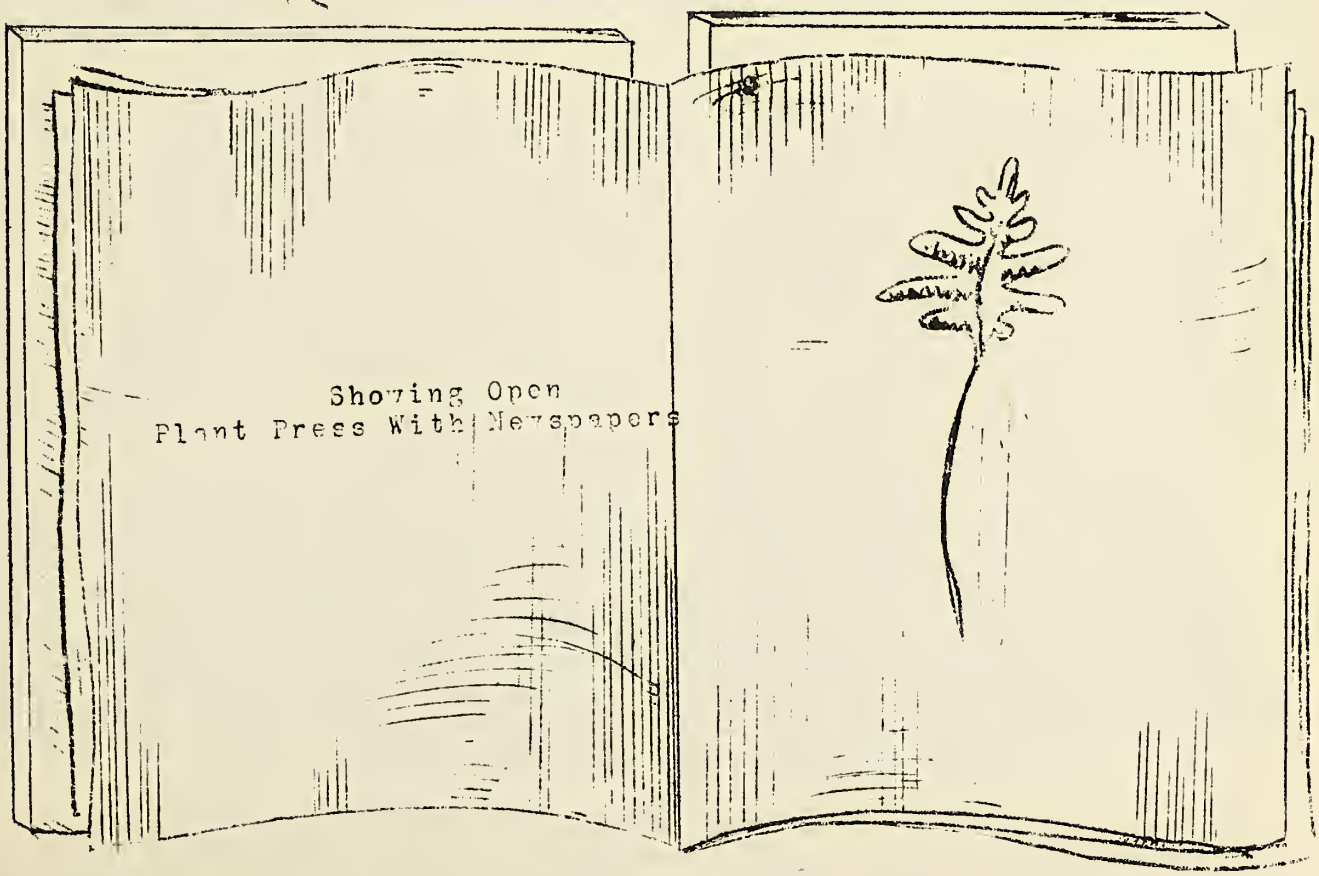


Fig. 5



Showing Open
Plant Press With Newspapers

culation of air around the press. The driers should be papers of an absorbent nature. I use newspapers almost entirely now - they are easily obtained and can be changed as frequently as necessary; besides, a folded newspaper fits a plant press nicely. When using newspapers, the use of blotters may be omitted provided you use several sheets of the paper to one specimen. The corrugated cardboard is as essential as are the driers and the boards. Placed between each folded paper containing a drying plant, the cardboard allows air to circulate within the press itself, speeding up the drying process and preventing mold from forming.

A dried specimen is rather brittle and cannot be bent or re-arranged. Therefore, when a plant is placed in a press to dry care must be taken to arrange the parts in the desired manner. An average size specimen can be placed in the press without bending the stem. Should the specimen be longer than the driers, bend the stem in the shape of a "V" or an "N". If the plant is still too large, collect only the characteristic parts (a few leaves showing arrangement, shape and form; the flower, the fruit, and parts of the stem). With the stem bent in the desired fashion arrange the leaves, flowers, or fruits in such a way as to prevent their overlapping one another. In some instances you will find this almost impossible to do; in such a case use your own artistic sense and judgment. Your specimen is now arranged on the driers (newspaper). Place your field label with it, put several sheets of newspaper above it, then a sheet of corrugated cardboard, close your press and apply pressure either by means of two or three straps or by using some heavy weight. If straps are used, be sure to tighten them every day or so, for this prevents the parts from wrinkling. After a week to twelve days your plant should be ready for mounting on the herbarium card.

The herbarium card - $11\frac{1}{2}$x$16\frac{1}{2}$ inches - is a heavy, dull white paper. A ream of this paper should weigh somewhere around 19 to 30 pounds. To mount the dried specimen, lift it carefully from the press and lay it on the card in the position you desire. A herbarium mount must be scientifically as well as artistically made. To hold the plant to the card I have always used narrow gummed cloth strips. The use of a roll of the gummed cloth cut to the desired width (1/16 to 1/8 of an inch) proves to be very economical as well as practical. Various pastes or glues may be used, but they tend to discolor and lose their adhesiveness. It is not necessary to "tack down" all the parts - just enough to hold the plant firmly in place. As in the field you have a label, so here you have a herbarium label. Fig. 6 shows the label we use at the Society. A herbarium label must have (1) name of the plant (2) locality (3) habitat (4) date collected (5) name of the collector (6) number. This label is glued to the herbarium card. The number on this label does not correspond to the field number, but is the number of the plant which can be found in standardized plant texts. The information from the field label should be copied on the herbarium label. Recently, I have been saving the field labels and have been placing the field number at the bottom of the herbarium label.

Every herbarium mount made should be recorded on a card or in a book arranged for that purpose. The Society's herbarium is being card indexed (one species to a card) - this allows space for additional mounts to be recorded on the same file card.

Fig. 6
Herbarium Sheet

X½ (approx.)

The various genera should be kept separated by means of genus covers. The same applies to the various families. The herbarium should be kept in a dry, air-proof closet. This protection insures the collection against the ravages of pests, and the possibility of change of color other than that which takes place as the plant dries. Many plants do not lose their color during the process of drying, but if they are exposed to sunlight afterwards they will bleach. Some botanists use cellophane covers over the entire card for further protection.

Ferns, mosses, club mosses, and horsetails are also dried and mounted in the way described above.

The various fleshy fungi are rather difficult to preserve. Generally a spore print is made of this group of plants. Directions for making spore prints can be found in the Bulletins of the Society-Vol. III, No. 4, page 13 - "Spore Prints" by W. W. Coleman. Besides the spore prints the following will be found very useful:

(1) Cut a thin vertical strip through the stalk and pileus - dry quickly by ironing; this shows form of pileus, gills, and stalk.

(2) Scoop out soft material from half of stalk and pileus-dry the same as above.

(3) Make complete notes of habitat, color (make sketch of plant and either paint or locate and name the colors), condition (slimy, rough, dry, etc.) consistency, and notes on the host plant.

Of course, the entire plant may be preserved in a solution of formalin. The woody specimens should be collected, labeled and must be kept in a dry place.

Lichens are comparatively easy to collect and preserve. In every case, be sure to collect a portion of the wood, rock or substratum on which the specimen is growing. Crustaceous forms of lichens are simply wrapped and labeled; the leafy forms require the use of a plant press.

Algae, fresh and salt water forms, may be collected by hand or by net. To mount these forms, float the various species in water (salt or fresh, depending on where the specimen was collected) and slide a sheet of paper under the plant, in the water; arrange the specimen as stated for the flowering plants, etc., then lift from the water, allow the specimen to drain and place in a botanical press to dry. Mount on the herbarium card in the usual fashion. The field and herbarium label should contain notes on the locality, date, name, habitat, depth of water, tide conditions, strength of current or the stillness of the water.

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COLOR AND COLOR CHANGES IN AMPHIBIA

By Joseph A. Bures

The amphibia, more than any other vertebrates, have the power of changing their color developed to a remarkable degree; this is especially noticeable in the frogs.

The actual granular pigment is contained in tiny cells, called chromatophores. The granular pigments are mainly brown, yellow, red, and black. Of course, variations and differentiations from the true color may occur, and do occur; for instance, of two captive Fowler's toads, one specimen's basic ground color was two parts sepia, one part van-dyke brown and the other was three parts sepia, one part burnt umber.

Of all the pigment cells , black pigment cells, interference cells, golden pigment cells, and red pigment cells are the basic ones for color changes and pattern variations. The most important of these are the black and yellow chromatophores, which are branching cells; i. e., they have the power of spreading out or contracting, and consequently may give the skin a darker or lighter hue, in compliance with the amphibian's environment.

1 2. 3. 4.

In Figure 1, the dermal cell, or chromatophore, is in a relaxed state and therefore contracted to a marked degree, so that there are no branching bodies. The action may be traced up to Figure 4, where the pigment body has spread out in a radial manner, and can, if linked with others nearby, produce the desired effect, which, in the case of browns, would change sepia to van-dyke brown.

Spherical golden cells contain the visual yellow pigment which acts similarly to the black chromatophores. Green color effects are a result of the reflection of light from granules of guanin through the golden cells. The granules of guanin are usually rhombic in shape and are contained around the dermal cells. (See Figure 2).

Most of the yellow pigment concentration in amphibians is either chrome yellow or lemon yellow in hue; cadmium or Naples yellow rarely occurring, except on the throats of some of the male tree frogs.

In some of the tree frogs, particularly those species of the genera Hyla and Acris, the color changes are remarkably similar

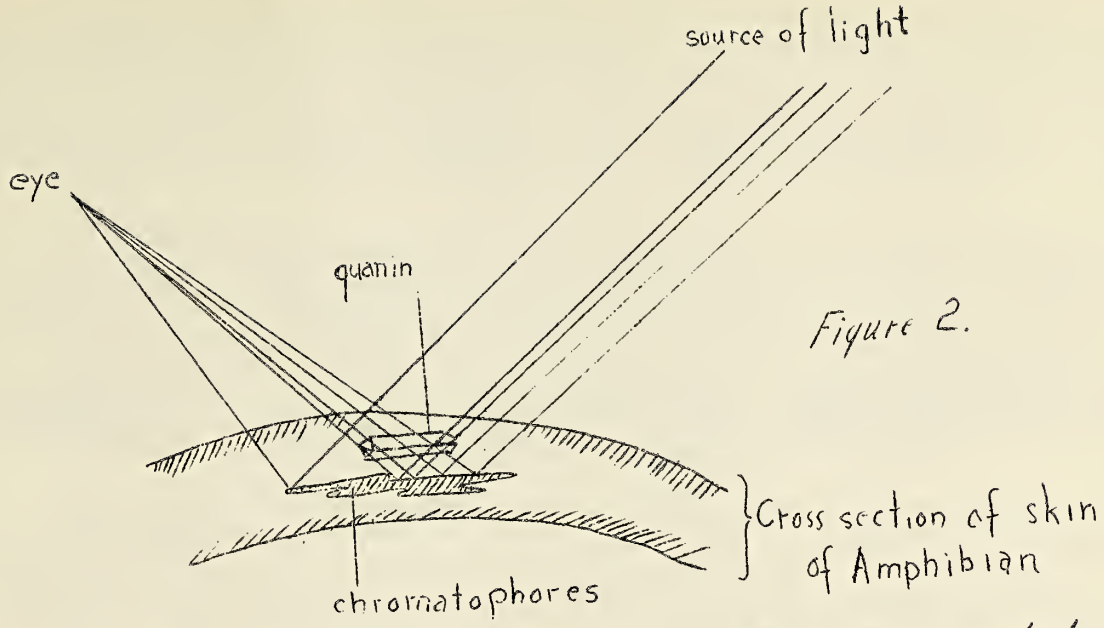

Figure 2.

Green light is reflected when quanin is between eye and dermal cell (chromatophore); yellow when ray is not intercepted and refracted.

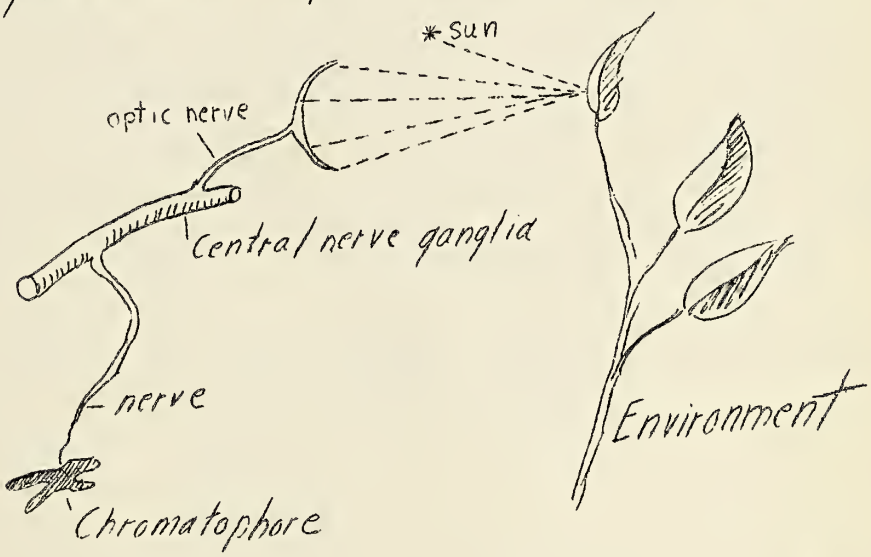

Figure 3.

Chromatophore will be affected according to color of environment thru visual and nervous senses.

to some of the tropical fishes whose color changing ability is entirely dependant on their surroundings. The changes are due to the reflection of incident light from nearby objects which acts upon the retina of the eye, and eventually upon the nervous system of the differently colored chromatophores and thus synchronizes the color of the amphibian with its surroundings. (See Figure 3).

Temperature, light, humidity of environment, chemical composition of the environment, and changes in the circulation of the amphibian are constantly affecting the dermal cells and producing color changes. Several specimens of the following were secured and subjected to various experiments: Acris crepitans Baird, Hyla crucifer Weid, Hyla squirella Latreille, Hyla versicolor versicolor (LeConte), Pseudacris nigrita feriarum (Baird).

The results obtained were as follows: When placed in normal room temperature (72° F.) and allowed to assume an approximate normal coloration in the terrarium, and then placed in a refrigerator the color became decidedly lighter; when subjected to heat a darker hue was assumed; when placed under brilliant light at room temperature the frogs grew lighter and the pattern changed also; in the case of Hyla squirella, the hitherto dark patches of the back then turned pale sap-green, with a tinge of lemon yellow. All the frogs grew darker when placed in rich black loam in a half-light at room temperature, except Hyla squirella, which remained the same. When the amphibians were placed in brilliant light and subjected to intense heat, a negative result was obtained with the exception of Hyla squirella, which turned lighter; when placed in dark under intense cold a negative result was obtained with the exception of Hyla squirella, which turned darker; these results would indicate that Hyla squirella is more responsive to its surroundings visually. These tests were made repeatedly with the same results each time.

Note: The following book deals with the same topic in less detail. Hegner, R.W.; College Zoology, Fourth Edition (1937).

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CATOCTIN

Mr. Karl E. Pfeiffer, Director of State Parks, and a member of our Society, writes us concerning an article in the Society's Bulletin wherein reference was made to "Catoctin National Park": "Two areas which were under the Department of Agriculture, one in Garrett County and one on the Eastern Shore, have been turned over to the State for administration under a 99 year lease agreement. The sign at the entrance to the area (Catoctin) reads 'U.S. Department of the Interior, National Park Service, in cooperation with the University of Maryland, State Department of Forestry, Catoctin Recreational Development Area'. All of the jobs in the area are O'K'd by this Department and we are consulted in the work. While it is true that the National Park Service is administering it until its completion when it will be turned over to us, it does not have the status of a National park."

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Notes for Month of March

Meetings and Lectures at Society

(February 17) - Address by Mr. Richard E. Stearns at the Annual Meeting of the Archaeological Society of Delaware, "Maryland Archaeology."

March 5 - General Assembly.
12 - Talk by Mr. Clyde Reed, "Some Ferns of Maryland."
19 - Talk by Mr. Price Piquett, "Instinct and Intelligence of Insects."
26 - Annual Meeting. Address by President, motion picture of Sherwood Gardens and Darling cartoon of Conservation.

Junior Division and Scout Troop

March 2 - Junior Division. Lecture by Mr. C. Haven Kolb, "Notes Taken on Observations in March."
4 - Scout Troop assembly.
9 - Junior Division. Lecture by Mr. Henri Seibert, "Internal Anatomy of Insects."
11 - Scout Troop - talk on locks.
16 - Junion Division. Lecture by Mr. Herbert C. Moore, "Science and Law."
18 - Scout Troop. Motion picture.
23 - Junior Division. Talk by Henry Eichhorn,"Embryology."
25 - Scout Troop assembly.
30 - Junior Division assembly.

Exhibitions, Lectures and Loans

March 5 - School No. 223. Loan of Birds.
8 - School No. 223. Loan of Insects.
10 - Chapel of Nativity. Young People's Fellowship. Lecture by Mr. George Maugans,"Snakes of Maryland."
15 - Roland Park Junior High School. General assembly. Lecture by Mr. Elra M. Palmer, assisted by Romeo Mansueti, "Snakes of Maryland."
21 - Memorial M. E. Church, Young People's Society - loan of Insects.
21 - Wilkens Avenue M. E. Church, Young People's Society - loan of Insects.
23 - Bonwit-Lennon Company - loan of Birds.
27 - Henry C. Conrad High School Science Club - lecture by Mr. Howard B. Owens, "Amic - Beavers in General, Beavers in Maryland in Particular."

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The Natural History Society of Maryland

BULLETIN

Volume X MAY, 1940 Number 9

BIRD BANDING

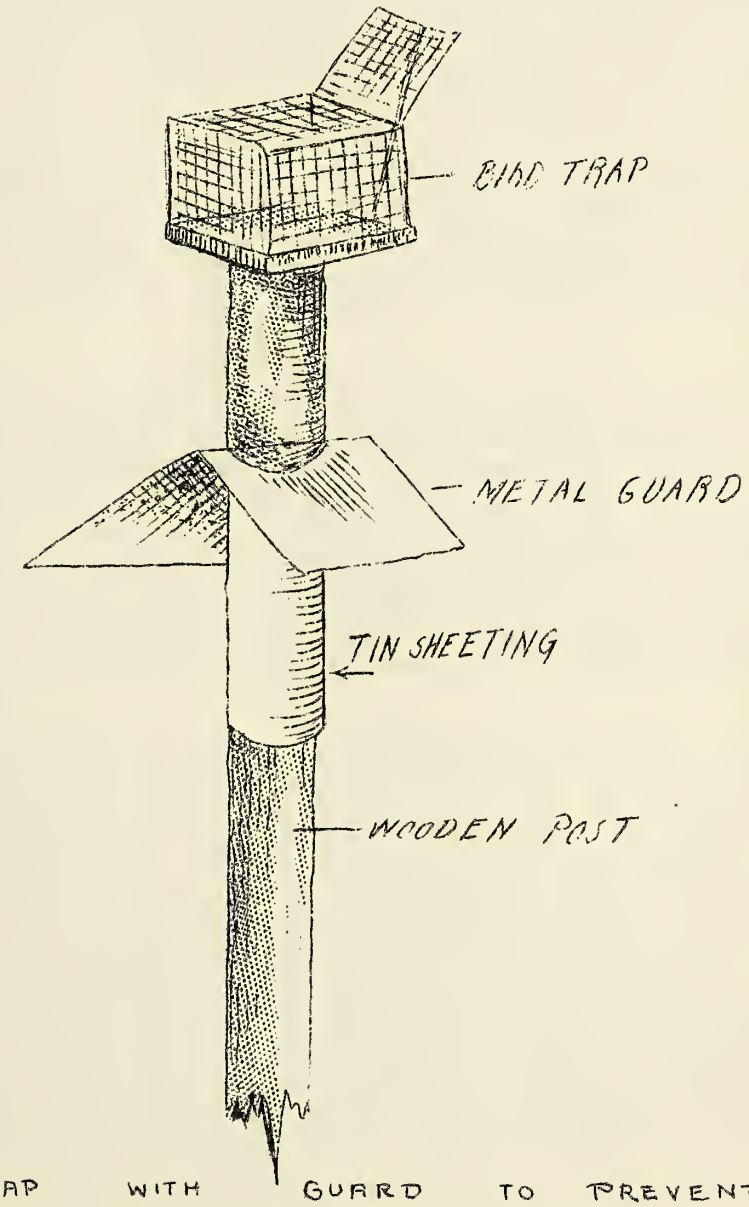
By Edward McColgan

Birds, as a class, have one characteristic that makes their study difficult, - that is their power of flight. While some birds cannot fly and a few other animals can, the birds and insects are the only groups in which flight is common to a great number of species. Birds not only fly, but also migrate, often going thousands of miles from their summer nesting places to their winter refuges. Since many of these journeys are made at night, and even those by day across difficult country, it is very hard to follow them and impossible to say if the birds arriving at one place are the same that have been observed at another place a short time previously.

To meet this difficulty a system of marking birds, known as "Bird Banding", has been devised, by which the individual bird can be recognized at other places and on returns to the place of original banding . The bands are rings of aluminum made in different sizes, from tiny bands suitable for a Song Sparrow or Junco to heavy and strong ones, suitable for the marking of Eagles. Each carries a distinctive number on the outside. There is also a request to "Notify Biological Survey, Washington, D.C." The smaller bands have this statement stamped on the inside of the bands, the intermediate sizes have it partly outside, partly inside, and the large ones carry it on the outside with the number. The band fits like a little bracelet and apparently causes no discomfort, as the birds return freely and often visit the place of banding a few days after the band is put on.

Bird banding was first triedin 1803 by the great Audubon, who placed small silver rings on a brood of Phoebes and was fortunate enough to recover two of them the next year. (Bird Banding Manual, Biological Survey). Banding was tried at various places afterwards, one interesting case being a stork which was banded during the 80's of the last century, with a band marked "Berlin," and the date of a summer month and the year. Later the bird returned with two bands, the second band bearing the inscription "Bombay,"

BIRD BANDS — DIFFERENT SIZES



ELEVATED TRAP WITH GUARD TO PREVENT THE ASCENT OF CATS AND RODENTS

with a winter date of the following year and "India sends greetings to Berlin".

In 1909 the Bird Banding Association was formed (Bird Banding Manual, Biological Survey) and the work undertaken systematically. On the ratification of the treaty with Canada for the protection of migratory birds, this work was turned over to the Biological Survey, then a bureau of the Agricultural Department, now of the Interior Department, and is carried on with the assistance of numerous volunteer cooperators, who furnish the bait and traps for securing the birds, while the Government supplies the bands and official forms for recording the capture. In addition to the latter, each station keeps a record of the captures.

The bands are very much like those carried by pigeons except that the pigeon bands being put on while the bird is young, are seamless and cannot be gotten over the foot of the mature bird, while the bird bands issued by the Biological Survey can be opened with pliers and placed on the leg of the mature bird and closed.

When a bird revisits a station and is retaken within a short while, it is called a "repeat", and the fact is merely noted on the home record, but if it is absent for three months or longer it is called a "return" and a filing card with the facts properly entered is sent to the Survey. At least once a year, the complete list of the captures is sent to the Survey on the proper form, one form for each species.

The captures at a banding station vary with the seasons. In the winter the hardy birds, which can stand severe weather, are present. White-throated Sparrows and Juncos in numbers, and an occasional Tree Sparrow are taken; also many birds that, while classed as permanent residents, do not come freely to the traps at other times. Among these may be mentioned the friendly and beautiful but also intelligent and trap shy Cardinal Redbird and the sharp but greedy Blue Jay. Other permanent residents are more noticeable at this time though taken the year round, as the White-breasted Nuthatch and the Tufted Titmouse.

As spring approaches, the great migrations begin; floods of birds pour in, and while a few weeks before only an occasional note of a Titmouse was heard, the woods are full of song. It is at this time of the year that most of the rarer birds are caught. One sometimes takes one of a species new to the station, but with a well established station this is an unusual occurrence. Also at this time, the great flocks of Grackles come north. These are the smaller bird bander's friends, supplying him with his most numerous captures, but with few returns, for the wise old rascals after once being caught, seem to realize perfectly what a trap is, and generally avoid it. In the spring, among the first arrivals can be seen old banded Grackles, walking round and round the trap, but absolutely declining to satisfy the bird bander's curiosity as to their band number. At this time too, many unexpected captures are made, some of the rare Thrushes being taken in traps baited only with seed, also frequent Wood Thrushes. Strangely enough, the Robin, which will let one walk within ten feet of it, is very hard to trap.

As summer approaches, the number of birds around the station

decreases; the great flocks have gone northward, and the birds which are to summer with us are sticking close to their nesting places. Nesting time is the quietest time of the year for a banding station.

Soon, the youngsters are flying and a number of immatures are banded; again the Grackles crowd in and many are taken. When the flocking season of late summer begins more are taken and again unexpected captures may be made, and before one knows it the full tide of the fall migration is on as the birds seek the southland.

The Society's station in the writer's charge was started in 1933 and since then from 200 to over 300 birds have been taken each year. The species banded number forty-seven, and a few more, warblers too small to band, have been captured. The returns vary in number from twenty-four Mourning Doves, of which twelve returned the following year, to 146 White-throated Sparrows, of which three returned and one was found dead. It may be called to the reader's attention here that the Dove is a member of a family that is noted for its homing instincts and that it nests near here as well as in regions but slightly farther north, while the White-throat is a Canadian or Arctic nester, and while wintering here is merely a casual wanderer, or is actually migrating.

Among the interesting returns to this station were a Junco or snow bird, banded here in March, 1934, and found dead at Williamstown, North Carolina, in March, 1936; and a Red-shouldered Hawk which was banded by the writer at Laurel, Maryland, and killed in Catonsville near the banding station. The birds vary greatly in their actions, some species showing absolutely no fear of the traps. One White-breasted Nuthatch repeated 101 times and was finally killed by an accidental fall of a drop trap; other species are very trap shy and once caught seldom return.

Sometimes there are curious results; for instance, during the first years, the Blue Jays were very common and very easy to trap; then became very scarce and hard to catch, being occasionally seen or heard but being very trap shy. In the first part of 1940, however, no less than nine Blue Jays have returned, while only four new birds have been banded. Most of these were of the last two or three years, but there was one banded in 1935 and another in 1936. Eight returns came in May. This, I think, indicates a flock returning from at least a local migration. While the Blue Jay is usually classed as non-migratory, it seems to be a local wanderer. Unfortunately no reports have been heard from other stations.

Another interesting case was that of a Mockingbird which on November 19, 1939 was brought in apparently dying. It was fed and cared for and, seeming much better, was banded and released on the following morning. It returned apparently in the best of health on May 9, 1940.

Of course the bulk of the results from bird banding are obtained by the coordination of the work of all the stations, but each contributes its portion to this total.

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SOME NOTES ON MARYLAND MIOCENE - THE GENUS PANOPAE

By Elra M. Palmer

Geologically the Lamellibranchs or Pelecypoda, (commonly known as bivalves) one of the great classes of Mollusca, range from the Ordovician to the present. They are of little stratigraphic value in the Paleozoic as they are not well preserved - mostly casts and molds. In the Mesozoic and especially in the Cenozoic they are well preserved and are often used as index fossils.

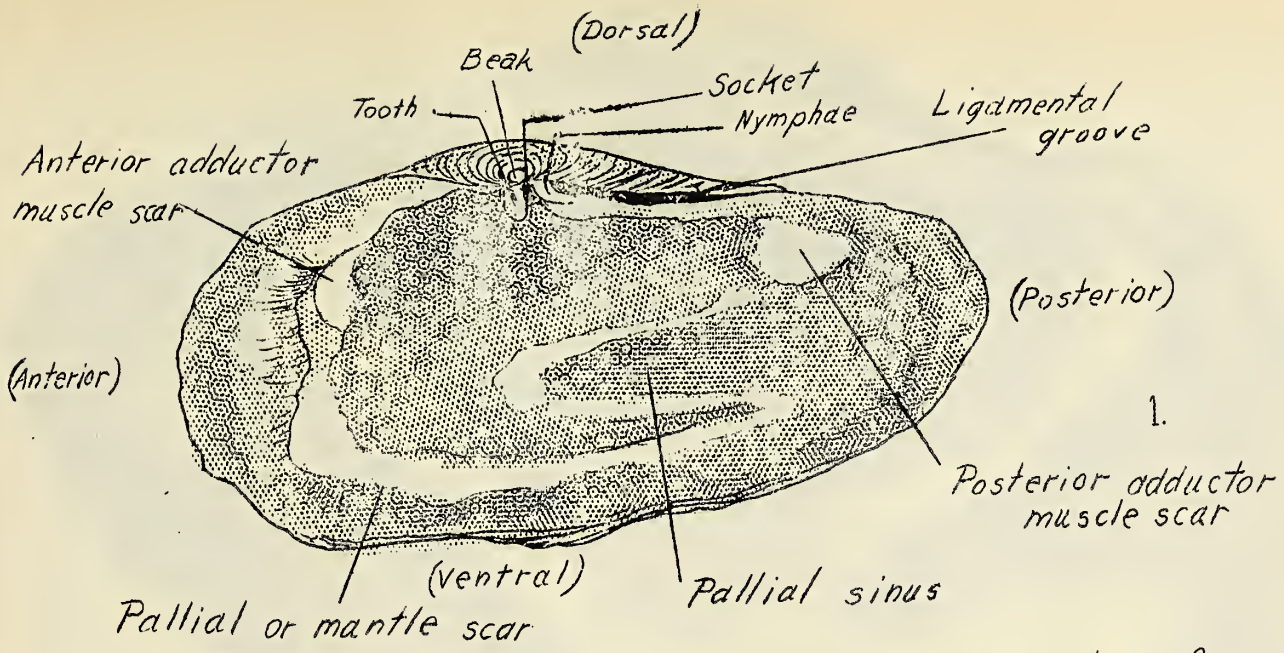
To understand the fossil Mollusca one should be familiar with the nature of the shell. First, there is the outer, thin, horny layer - the periostracum, which imparts the color to most of the modern shells. The periostracum also acts as a protective layer, preventing corrosion from the carbonic acid of the water. This layer is usually absent in fossil forms. Beneath the periostracum is the limy or porcelaneous layer, frequently termed the prismatic layer. This layer is composed of lime and is most often preserved as a fossil. The third or inner layer consists of mother-of-pearl or the nacreous layer, usually spoken of as the laminated layer. This layer is made up of many thin lamellae of a dissolvable form of carbonate of lime known as aragonite. Due to the nature of the laminated layer it is frequently destroyed during the processes of fossilization.

Of the many Pelecypods found throughout the Maryland Miocene those of the genus Panopae command a note of interest. Three species are listed by the Maryland Geological Survey, P. whitfieldi, P. goldfussii, and P. americana. The Society's collection lacks P. whitfieldi, but contains the other two species.

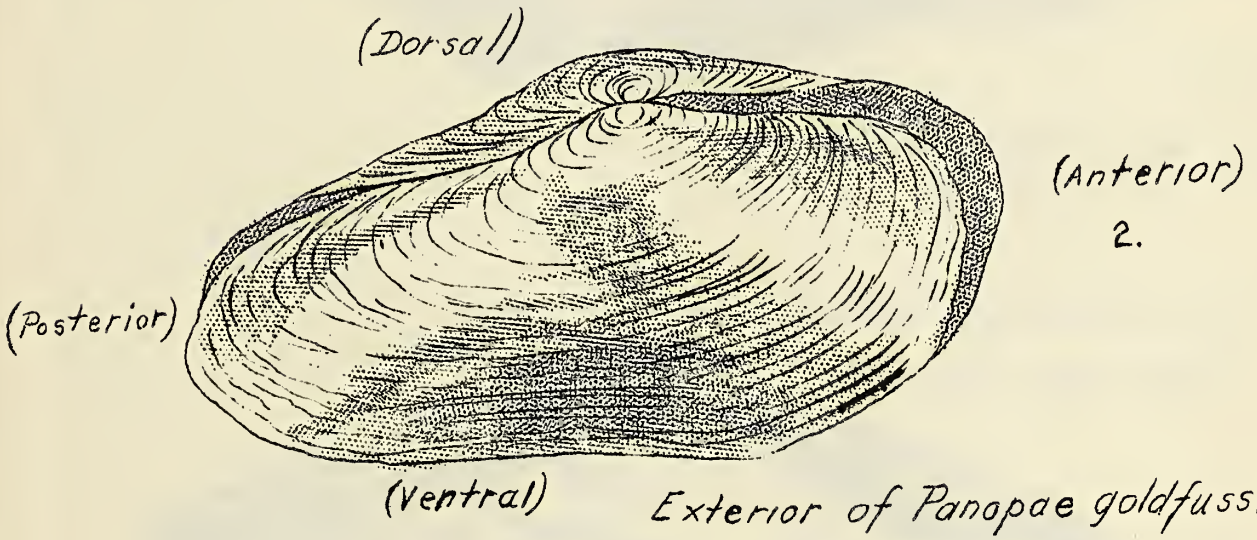
Panopaea goldfussii is the smaller of these two Miocene dimyarian pelecypods. The beaks or umbos of both species are directed toward each other and are hence said to be orthogyre. The valves are united to each other dorsally along a straight hinge line. The interlocking is effected by means of a tooth on each valve which fits into a socket in the opposite valve. The ligamental grooves extend posteriorly from the beaks and are designated as opisthodetic. The nymphae are striated. There is but one cardinal tooth in each valve, situated immediately beneath the umbos.

The ornamentation of both P. goldfussii and americana is very simple and consists merely of coarse growth lines arranged concentrically in respect to the beaks. Growth lines are produced by increments made at the margin of the valves. The pallial sinus of the P. goldfussii is of considerable magnitude in proportion to the valve. This is apparently indicative of an animal equipped with a large siphon. The shell is ellipoidal in shape and is open anteriorly and posteriorly. The anterior margins are broadly rounded. The posterior is elongated and narrower than the anterior and the posterior dorsal margin is nearly straight with the plane of symmetry.

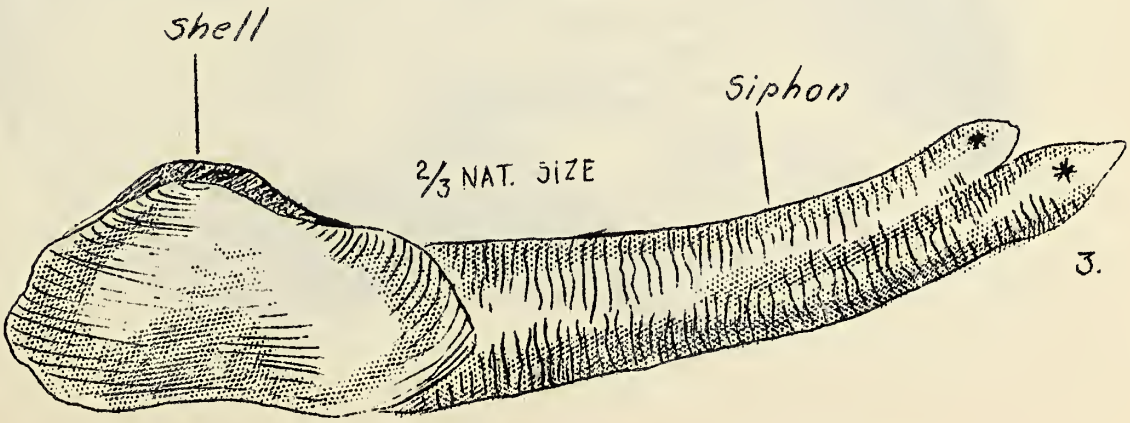
The best preserved specimen of P. goldfussii in our collection measures 98 mm. in length, 57 mm. in height and 40 mm. in thickness. It was collected at Chancellor Point, Maryland (August 15, 1932) on the St. Mary's River, in Zone 24 of the St. Mary's



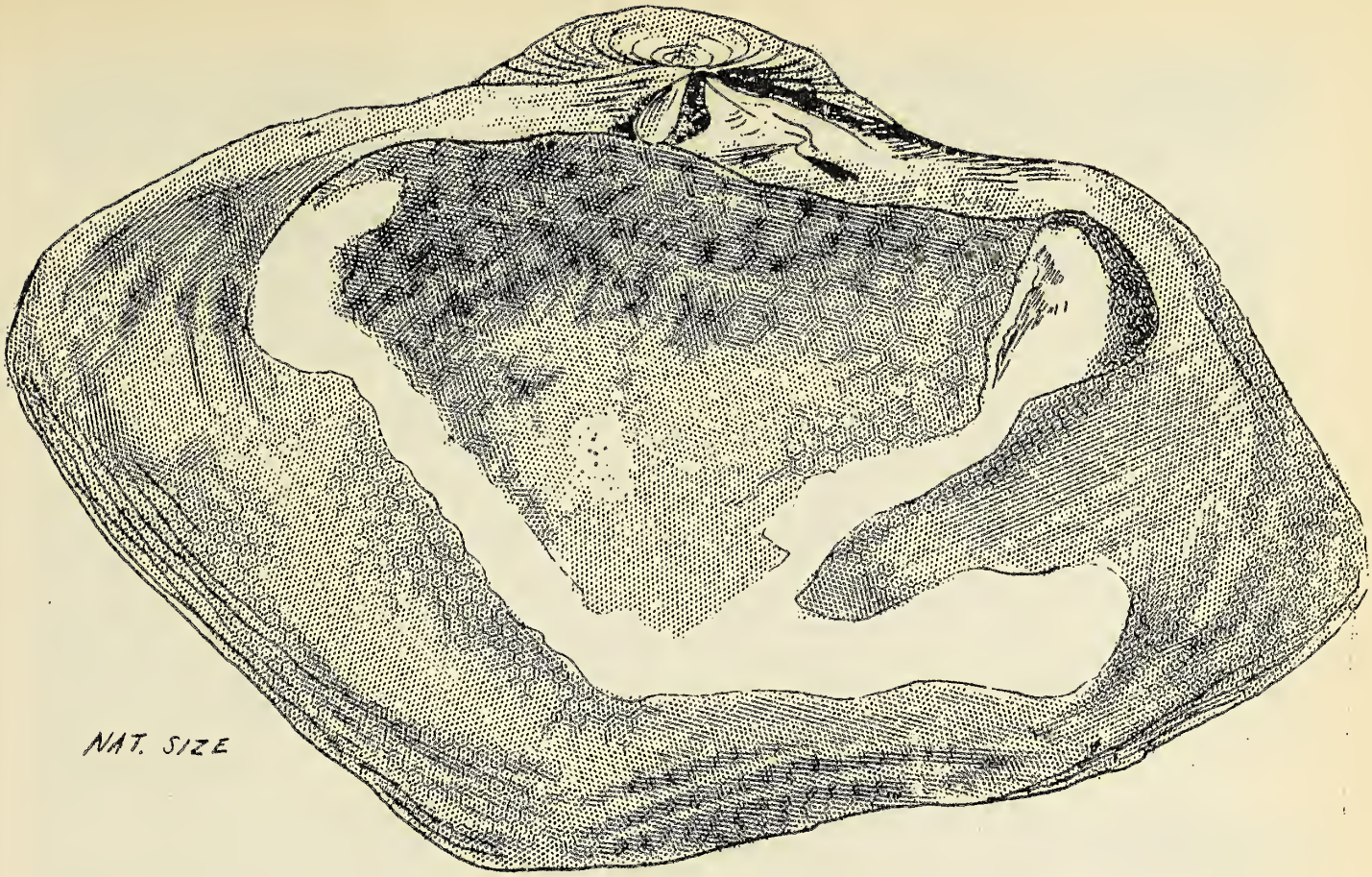
Interior of right valve of Panopae goldfussii. (NAT. SIZE)



Exterior of Panopae goldfussii (NAT. SIZE)

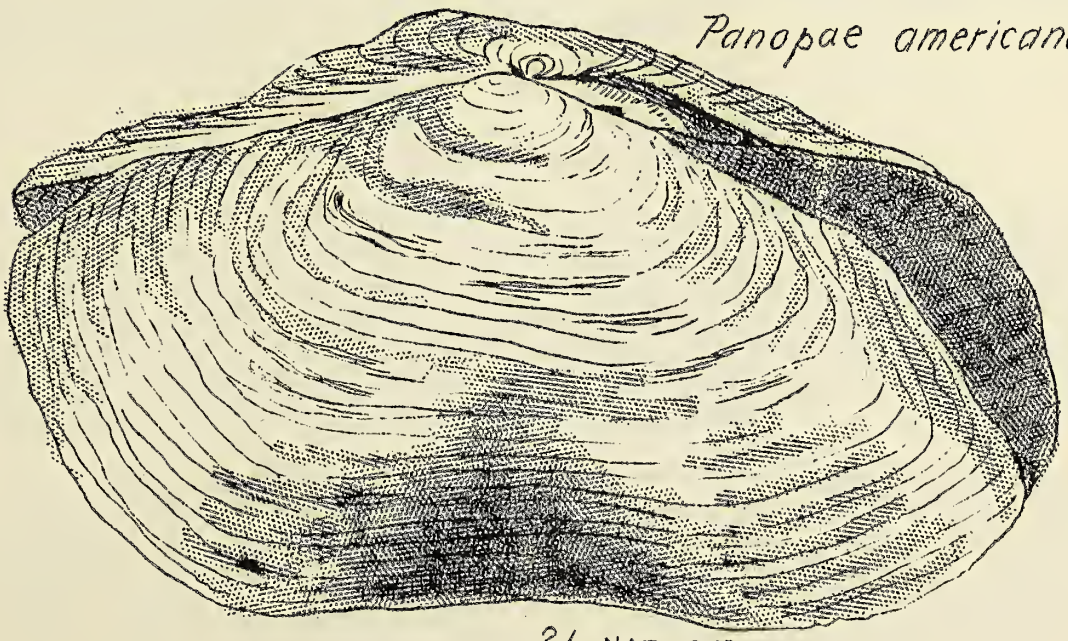


Living form (Panopae norwegica)



4. Internal right valve of Panopae americana

External left valve of Panopae americana



5.

Formation and was associated with Turritella plebeia, T. variabilis, Phacoides anodonta, etc. Specimens have been collected at Langleys Bluff and the area south of Flag Pond. Poorly preserved fragments have been noted in the Calvert Formation south of Plum Point Wharf.

Panopaea whitfieldi is apparently confined to the Calvert Formation and is smaller than P. goldfussii. According to the Miocene Text, Maryland Geological Survey - "It differs from P. goldfussii Wagner, in being more equilateral, less expanded anteriorly and less contracted and produced posteriorly."

Panopaea americana is one of the larger bivalves found in the Maryland Miocene deposits. They are abundant and well preserved in the Choptank Formation. The largest valve of this species in the Society's collection measures 214 mm. in length and 113 mm. in height . Most of our specimens average around 163 mm. in length, 97 mm. in height , and 45 mm. in thickness. The anterior dorsal margin is nearly straight with the plane of symmetry and is longer than the posterior dorsal margin. The shells are open at both extremities and the ventral margins are contracted in the middle. The anterior and posterior margins are both oblique and truncated. The empayment of the pallial line is not nearly as pronounced as in P. goldfussii.

The genus Panopaea belongs to the order Teleodesmacea. There are a few species of Panopaea existing today and they are widely distributed. All of the species are marine and are burrowers, having a large and long siphon. P. generosa, a Pacific coast species about six inches in length, the largest bivalve of the West Coast, is reputed to have a siphon nearly a yard in length. The largest living species, P. aldrovandi of the Mediterranean area is ten inches in length and has a correspondingly large siphon. The modern species shown in the accompanying illustration is that of P. norwegica. This animal is found off the New England coast and measures three to four inches in length and has a great siphon.

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USES OF CHROME ORE

(Mr. Winslow H. Hartford of the Mutual Chemical Co. of America has been so kind as to advise us as to the principal uses of this ore in modern industry. Chromite holds a particular attraction for those interested in the mineralogical history of Maryland, since this mineral was discovered in America at Bare Hills, near Baltimore, about 1810. Chrome was a little known metal at the time. See N.H.S. Bulletin Volume V, Number 1, Sept. 1934.)

The largest use of chrome ore is in the manufacture of chromium alloys, particularly the various chrome steels, which are in the main produced from ferrochrome, although the Rustless Iron Corporation of Baltimore uses the ore directly. Ferrochrome is not in itself a widely-used alloy, but is rather an intermediate, produced by direct reduction of chrome ore in electric furnaces, which is used for the incorporation of chromium in steels for the purposes mentioned. By far the most spectacular development of the last 15 years in this field, and the most important chromium alloys, are the

stainless steels, of which the 18% chromium, 8% nickel, used for architectural trim and other fabricated parts, is the most important. The 13% chromium, 1% carbon alloy is not readily worked and is restricted mainly to use in cutlery. Other chromium alloys have been developed to resist scaling and deformation at high temperatures, sulfurous furnace and oil-still gases and the like.

Stellite, although a useful alloy in high-speed machine tools, and one of the few hardenable non-ferrous alloys, can hardly be considered a serious rival to steel, since its production is small and its cost very high.

The second largest use of chrome ore, although not by a large margin, is as a refractory, in cements, bricks and furnace linings.

The manufacture of chromium chemicals is the third largest use of chrome ore, the factory of this company at Baltimore being the largest plant of this type in existence. Pigments are not manufactured here, and chromic salts, in the form of a basic chromic sulfate for tanning leather, form only a small part of the production. Sodium bichromate is the principal product of the chromium chemical industry. This compound, with the allied products sodium chromate, potassium chromate, potassium bichromate and ammonium bichromate, finds use primarily in the manufacture of the dry colors mentioned and in the tanning of leather. Dyeing, chemical manufacture, corrosion prevention, photography, and photo-engraving, ceramics, etching metals, bleaching fats and oils, and wood preservation constitute other uses. Chromic acid is also manufactured here; this is the material which in solution forms the electrolyte from which chromium is plated.

The use of bichromates and chromic salts in the tanning of leather is widespread and the chrome tanning process finds use not merely for light glove leathers, but to some extent in all branches of the leather industry, and especially in the manufacture of shoe uppers.

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Notes for Month of April

Meetings and Lectures at the Society

April 2 - Talk by Mr. August Selckman, "Value of European Starling."
9 - Talk by Mr. Elra M. Palmer, "The Ghost Crab."
12 - Opening of Bird Course. Lecture by Mr. C. Haven Kolb, "The Importance of Bird Study."
16 - General assembly.
19 - Bird Course - lecture by Mr. Irving E. Hampe.
21 - Bird walk.
23 - Talk by Mr. Richard E. Stearns, "Shell Heaps."
26 - Bird Course - lecture by Mr. C. Haven Kolb, "Bird Songs and Mating." Lecture by Mr. Irving E. Hampe, "The Nest and Care of Young."
28 - Bird walk.

April 30 - Talk by Mr. Edmund B. Fladung, "Insects as Food."

Junior Division

April 6 - Lecture by Mr. Earl H. Palmer, "Spring Flowers."
13 - Talk by John Norman, "Some Salamanders of Maryland."
13 - Talk by Henry Eichhorn, "Geological Aspect of the Problem of Animal Relationship."
27 - Talk by William Norman, "The Bull Frog and the Frog Industry."

Scout Troop Meetings

April 1 - Assembly.
8 - Assembly.
15 - Assembly.
22 - Assembly.
29 - Assembly.

Exhibitions, Lectures and Loans

April 5 - To Mt. Rainier High School by Mr. Elias Cohen, "Superstitions and Fallacies Regarding Snakes."
5 - To University of Maryland, class in Animal Ecology, by Mr. Elias Cohen, "Snakes from an Ecological Point of View."
9 - To Baltimore City College - loan of Insects.
12 - To Twin Maple School - loan of Birds.
15 - Enoch Pratt Library - Central Branch - Exhibition of Work of Summer School 1939.
20 - To Baltimore City College - lecture by Romeo Mansueti, "Snakes of Maryland."
22 - Baltimore City College - lecture by Romeo Mansueti, "Snakes of Maryland."
26 - Enoch Pratt Library, Walbrook Branch, Exhibition of Indian Artifacts.

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The Natural History Society of Maryland

BULLETIN

Volume X JUNE, 1940 Number 10

THE WOOD FROG IN MARYLAND
RANA SYLVATICA SYLVATICA (LE CONTE)

By Romeo Mansueti

Perhaps the most handsome and daintily-colored tailless amphibian in Maryland is the Wood Frog. It is one of the first frogs to greet the spring with its harsh but welcome voice. The idiosyncrasies of this frog make it the most interesting Ranid to study. Since it is intermediate in characteristics between the tree frogs and distinctly aquatic true frogs it can be called a typical frog of Maryland.

The Wood Frog may be termed a relatively small species. The head is rather broad and distinctly pointed. The body is rather flat. The tympanum does not exceed the size of the eyes, and it does not vary in size according to sex as do the Green and Bull Frogs. The skin is smooth and moist, with very few tubercles. The dorsolateral folds are very conspicuous, beginning at the eyes and extending backward to the anus. The hind limbs are long and slender, and the toes are also very long with well-formed webs.

The somatic sexual characters are so insignificant that the male and female are often very hard to distinguish. However, in examining specimens, the writer has discovered that the fore-limbs of the males are very short and thick while those of the females are rather slender and thin. The tympanum, as said before, does not vary enough in size in the different sexes to warrant distinguishing male and female by this means. Another successful method of sorting males from females is to examine a large series of average-size individuals,-those that are large may be classed as females, whereas those that are small are usually males. An examination of a large series of Wood Frogs shows that the thumbs of the male do not become enlarged in the breeding season as do those of the Green Frog.

The Wood Frog is truly the most beautiful salientian to inhabit the Maryland woodlands. Its ability to mimic the Chameleon and Tree Toad, in changing patterns and hues without difficulty under

WOOD FROG
(Rana sylvatica sylvatica)

varied temperature and light conditions, makes it a very interesting amphibian to study. Nevertheless, its colors are so unique that no matter what the pattern, it can readily be identified from other species. Most specimens seem to have a delicate creamy, brown ground color, but because of external stimuli and internal pigment nerves, other hues may be noted on one individual. In the spring, specimens seem to be dark brown in ground color, apparently from the cool and moist climatic conditions. Specimens have been taken in the summer with a ground color of salmon red, creamy orange, light gray, almost white with shades of tan, light and dark yellow, light and dark brown, tan, auburn, etc. Specimens placed under various artificial conditions of temperature and light have been observed to change to a bright or a drab state. On one occasion a light tan Wood Frog was observed perched on a piece of black bark and thirty minutes later the writer noted that the frog had changed to a very dark brown. Individuals taken in the water are usually very dark in color, but after a short time in a dry collecting bag or jar, they become a very bright canvas tan. Usually when placed in rather dry and light surroundings, or in a heated environment, they assume a light body color; however, when subjected to a cold area, or placed in a dark and moist position, they become dark in general coloration. The black pigment cells or chromatophores, when subjected to the former physical stimuli, (dry conditions, light and heat), will contract or retreat below the light surface epidermis, thus resulting in a light colored frog, while the opposite circumstances will obviously result in a dark colored frog. If the frog becomes light in a dark, cold and moist state, it may have been urged by some internal stimulus.

From the nostril on the upper jaw to the forearm, there is a rather straight light whitish or creamy line. There is also a black line or spot present at the base of the forearm. The most conspicuous marking on this frog is the dark brown band which extends from the end of the snout, along the jaws and sides of the head, widening at the tympanic membranes and gradually tapering to a point at the angle of the jaw, or at the end of the light line present on the upper lip. The dorsolateral folds are a rather light orange or yellow. Some specimens are lightly mottled with dark markings on the side of the body. The legs and toes are more or less banded or barred with dark brown. The belly is usually an immaculate white, yellowish or greenish white. Some specimens are mottled on the anterior ventral surface.

Sex differentiation from color is often difficult, but as a rule most males are darker than females.

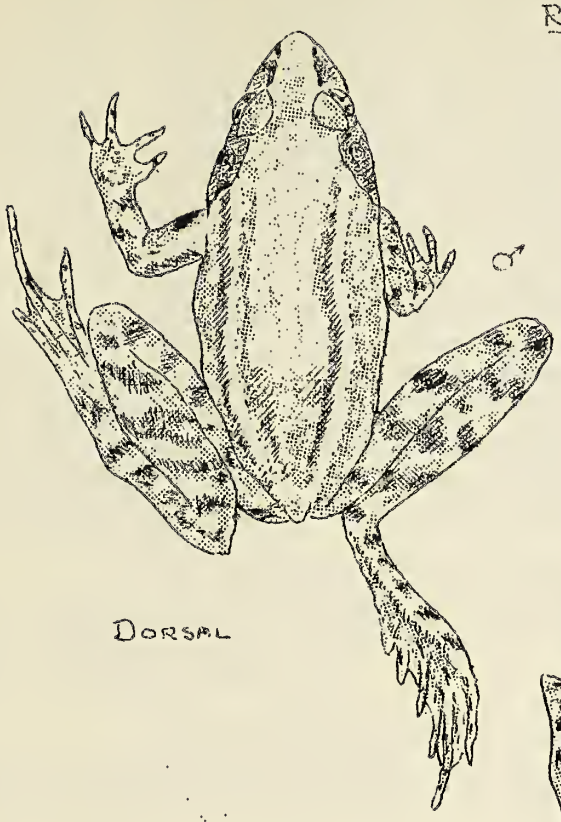
As mentioned before, this frog is rather small. Females hardly ever exceed two and one half inches, males - two inches. The females are always larger in proportion to the males. The hind limbs are extremely long and slender in this species. Measurements of a series of Wood Frogs are presented herein, preceded by locality data, etc.

The data on each specimen measured is as follows:

1 - Adult female, taken about mile from Arbutus,4-30-'40,R.H.Coll'.
2 - Adult female,Glenartney, Maryland,4-19-'34,Louis Putens Coll.

VIEWS OF THE WOOD FROG

Rana sylvatica sylvatica



DORSAL

SIDE

FRONT

Top View of Hind Limb

Ventral View of Hind Limb

3 - Adult male, Glenartney, Maryland, 4-5'34, Louis Putens Coll.
4 - Adult male, Glenartney, Maryland, 4-5'39, R.M. Coll.
5 - Adult male, Glenartney, Maryland, 4-5'34, Louis Putens Coll.
6 - Adult male, Glenartney, Maryland, 7-8'34, Louis Putens Coll.
7 - Adult female, Glenartney, Maryland, 8-8'34, Louis Putens Coll.
8 - Adult male, Glenartney, Maryland, 4-1'34, Louis Putens Coll.
9 - Adult male, Glenartney, Maryland, 4-1'34, Louis Putens Coll.
10- Adult male, Vineyard, Maryland, 3-1-'36, Louis Putens Coll.
11- Adult female, Glenartney, Maryland, 3-1-'36, Louis Putens Coll.
12- Adult female, Vineyard, Maryland, 3-1-'36, Louis Putens Coll.
13- Adult female, Glenartney, Maryland, 6-19-'34, Louis Putens Coll.
14- Adult female, Glenartney, Maryland, 6-..-'34, Louis Putens Coll.
15- Emerged Frog, mile from Arbutus, Maryland, 6-9-'40, R.M.Coll.
16- Emerged Frog, mile from Arbutus, Maryland, 6-9-'40, R.M.Coll.
17- Emerged Frog, mile from Arbutus, Maryland, 6-9-'40, R.M.Coll.
18- Tailed Frog, mile from Arbutus, Maryland, 6-9-'40, R.M.Coll.
19- Tadpole, mile from Arbutus, Maryland, 5-18-'40, R.M.Coll.

The symbols used below are as follows: No. - number, B.L. - body length, W.H. - width of head, F.L. - forelimb, F. - femur, T. - tibia, TA. - tarsus, W.F. - whole foot, L.H. - length of head, W.T. - with tail.

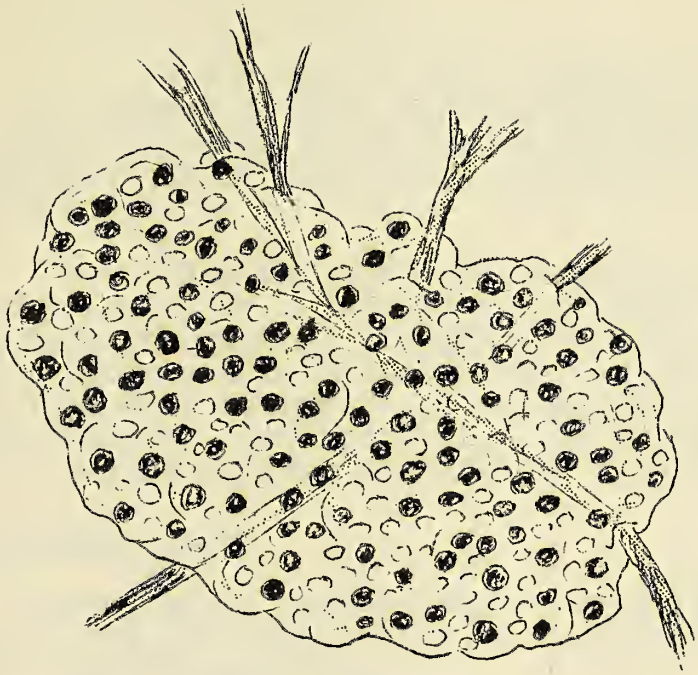
The largest female examined by the writer was 60 mm. from snout to vent and is No. 13 in the table. The largest male measured 55 mm. and is No. 10 in the table.

Measurements of Adults
(Measurements in millimeters)

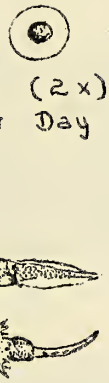
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
B.L.	49	56	45	45	47	41	43	44	45	55	53	56	60	57
L.H.	12	16	12	13	12	12	12	11	12	15	15	15	17	16
W.H.	18	20	17	17	16	17	16	16	16	19	19	20	20	20
F.L.	26	31	19	18	27	21	26	20	20	24	29	21	30	34
F.	23	30	18	21	17	21	21	22	20	24	26	27	25	21
T.	26	39	24	25	25	23	24	24	23	25	26	28	27	30
TA.	14	17	14	14	13	12	12	11	12	12	15	15	12	16
W.F.	27	32	25	23	24	23	24	23	24	26	28	30	28	31

Measurements of Young

No.	15	16	17	18
B.L.	12	16	16	11
W.T.	--	--	--	17



EGG MASS ATTACHED TO TWIGS
FROM APRIL TO MIDDLE OF MAY

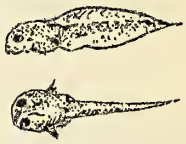


EGG (2x)
1st Day

EMBRYO
6th Day

14th. day

TADPOLES



20th day

(2x)

TADPOLES
WITH
HIND LEGS

8th Week

(2x)

TAILED FROGS
10th Wk.

LIFE
SIZE

YOUNG WOOD
FROGS

FULLY TRANSFORMED

8 to 9 weeks Later

DEVELOPMENT of the WOOD FROG

Measurement of a Tadpole

No.....19

B.L..... 7

W.T..... 25

The range of this species, as stated in the Fourth Edition of the "Check List of North American Amphibians and Reptiles" by Leonhard Stejneger and Thomas Barbour, is from "Quebec and Nova Scotia to South Carolina, westward to southern Ontario, and Ohio to Arkansas."

Although the Wood Frog has not yet been collected from every county in Maryland, the writer believes that this species can be found throughout the State. Most of the material for life history study has been accumulated in the area along the Patapsco River at Vineyard, Glenartney, etc. in the Patapsco State Park, in Baltimore County. Nevertheless, this species has been captured and observed in various localities, listed under counties as follows:

Baltimore City:

Cherry Hill, Western Run Parkway, Gwynns Falls Park, Herring Run Park, Hampden and Woodbury Area, Druid Hill Park, St. Mary's Seminary and Govanstown.

Baltimore County:

Oella, Orange Grove, Ilchester, Glenartney, Vineyard, Avalon, Relay, Arbutus, Halethorpe, Randallstown, Bull Run, Patapsco River, Gwynn Oak Park, Pikesville, McMahon Quarry, grounds of the Bonnie View Golf Club, Curtis Wright Airport, Herring Run Swamp, Gunpowder Falls region, Gunpowder Swamp, Loch Raven, Woodstock, Granite, Texas, Towson.

Howard County:

Orange Grove, Ilchester, Glenartney, Vineyard, Avalon, Relay and other localities on this county's side of the Patapsco River, and Ellicott City.

Anne Arundel County:

Camp Linstead, Cromwell's Woods, Lake Shore, along the Magothy River, Glen Burnie and Crownsville.

Prince Georges County:

College Park and Laurel.

Cecil County:

Bacon Hill and Singerly.

Frederick County:

Catoctin Recreational Area, Lily Ponds, and Sugar Loaf Mountain.

Garrett County:

Jennings.

Harford County:

Swan Creek

Kent County:

Chestertown.

Wicomico County:

Salisbury

Queen Annes County:

Love Point.

Dorchester County:

Cambridge.

Calvert County:

Cove Point.

The writer has no records from Allegany, Washington, Montgomery, Carroll, St. Marys, Charles, Talbot, Worcester, Somerset and Caroline Counties, but the species undoubtedly occurs generally in the State.

The Wood Frog is more truly a land frog than any other species in Maryland. It is a terrestrial amphibian, making its home in the damp and cool forests and woods. Only in springtime has the writer found it near bodies of water and at this time the species frequents transient pools, slow-moving streams, ordinary ponds, and cat-tail marshes. After the breeding period these frogs leave the water and go to the surrounding woods and meadows. By hunting diligently in the summer and fall one may collect them in deeply shaded glens and ravines and in wooded areas about ponds and swamps, but hardly ever in the water. Sometimes they are found in very dry localities, where the discovery of any amphibian or reptile would be unusual. Nature has particularly gifted the Wood Frog with the power of completely camouflaging itself in its terrestrial environment. In the forest it is difficult to detect this species from a background of brown and orange fallen leaves.

Wood Frogs hibernate under piles of leaves, under logs, debris, rocks and in the soil, and possibly in the water. They can endure an astonishing amount of cold; even freezing in the water of a pond or in mud at the bottom will not necessarily cause death.

On March 9, 1935, Louis Putens records them at a temperature of 32 degrees F., and John Norman has taken this species at a temperature of 40 degrees F. The writer has taken specimens at 44 degrees F. During very cold weather in the spring, the circulation and life processes may cease in the Wood Frog, but if the blood and protoplasm of the heart do not fall much below that of freezing-point, the frozen parts will recover. In the spring the Wood Frog is usually awakened by the high temperature, and is spurred on to accomplish its vital life process by migrating to the water. During the summer, when it becomes unbearably hot, Wood Frogs are not often found, and at this time they are in aestivation, hiding away in cooler places under moss, stones, damp grass, logs and hollow trees. Wood Frogs can endure a much higher temperature than the other Ranids.

The Wood Frog is the real herald of spring, and is heard very much earlier than other species. The earliest date on record for Maryland is February 23, 1890, and this date was noted in Baltimore by T. H. Morgan. Louis Putens reports them from Glenartney on March 3, 1935; March 8, 1936; March 6, 1937, respectively. The writer's notes for the last three years contain records of hearing this species at Glenartney on March 12, 1938; March 5, 1939; and March 3, 1940. John Norman records this frog on March 1, 1939 at Western Run Parkway in Baltimore City.

The Wood Frog is usually recognized by its unique voice. It only "sings" or "clucks" during the spring - the breeding season, and the males accomplish all the vocalizing. This noise is more or less an explosive clucking. At Glenartney, as one approaches the long stretch of transient pools, these frogs sound similar to a flock of hens clucking. In producing this sound, the Wood Frog distends the sides of its head and the area over its shoulders, although these organs are not well-developed sacs, as in the Leopard and Green Frogs. When it clucks, it swells the side of its throat with such an explosive vigor that it causes ripples in the water. It is rather shy while "singing", and when approached will dive into the water and quickly discontinue courtship efforts. The male sometimes accompanies its clasping with guttural croaking and clucking.

Lured by warm weather and the spring sunshine, Wood Frogs migrate to the water from their hibernating quarters, and the males and females congregate to begin their clasping. The following notes were made at Glenartney:

The clucking male approaches the much larger female and grips her back and sides just behind her forelimbs. After attaching himself firmly, the male continues its low croaking, and then the pair move about until they find a suitable stick or weed on which to deposit the eggs. This embrace is known as pectoral amplexation. Sometimes, a day or so may elapse between the time the male attaches himself and the female begins to lay eggs. Prior to egg laying the female draws or hunches her hind legs up in a cup-like formation. The male then doubles his legs back with his feet pressing her anus, and pushes inward several times, thus forcing the eggs from the female's cloaca. During this procedure, the male aids the delivery and formation of the egg-mass by outward kicking motions of his legs. As the eggs pass out, the male exudes his sperm upon them, thus fertilizing them. Both sexes help to hold the eggs in an

orderly fashion; then the male leaves the female. The egg-mass, after being laid, is about the size of a golf-ball, but after water is absorbed in it, becomes greatly enlarged,so that a whole mass can easily fill one's hand. The female does not care for the eggs.

Some females are mobbed by four or five males. Even though other frogs are in the immediate vicinity of Wood Frogs, the writer has yet to see another species attempt to mate with the Wood Frog, or vice versa. After a few days around their breeding pools, the frogs move to the woodlands, so that about the beginning of May, Wood Frogs are rarely heard or seen in the water.

There may be from one thousand to three thousand eggs in one mass, but no counts have been made by the author. These eggs may be attached to grass, weeds, sticks, or twigs in shallow water, but some have been observed lying loosely, not attached to anything. After a time, the eggs flatten and diffuse over a wide space on top of the water. The gelatin about the eggs becomes green and the eggs are thus camouflaged, protecting them from their numerous enemies. When protected in this manner, the eggs are very hard to distinguish from the familiar green pond scum. The green plants, which cause the green pigment in the gelatin, absorb the carbon dioxide emitted by the tadpoles; conversely, the plants give off oxygen, which the hundreds or thousands of tadpoles require to reach maturity. If the water freezes, the eggs will not die. The eggs are brown above and light below. These laid very early in the spring require a longer length of time to hatch (about 30 days), while those laid in late spring hatch in about 10 or 15 days.

After the tadpole, which is rather black or dark brown with rather long external gills, emerges from the jelly-like mass, which had been its food and protection, it proceeds to act as a scavenger on the bottom of the water where it eats vegetable and animal matter. In captivity, tadpoles will eat bread crumbs, bits of raw beef, fish food, etc.

As the tadpole continues to change into a true frog, many structural developments occur. The arms and legs develop at the same time, but the latter appear first, since the forelimbs are concealed by a membrane of the anterior portion of the body. The tail is absorbed and it shrinks. To exercise its lungs for future use, the "semi-Wood Frog" may be seen swimming to the top of a body of water to suck in air. It loses its unusual-looking horny mouth parts, and assumes the "smiling" features of a true frog. The metamorphosis of the Wood Frog is speeded up by the lack or shortage of natural food; the tadpole utilizing by absorption the stored up food in its body. However, if there is an over-abundance of food, the development will be prolonged.

At an old saw-mill near Arbutus, on the outskirts of a transient pond, the writer found a swarm of young grayish-brown Wood Frogs on June 9, 1940. The whole pond had dried up. The frogs were fully developed, but several still possessed short tails. About this pond, these frogs were jumping about in a haphazard manner, although they were very alert and swift. Their alacrity was due to the unusually long legs and slender body. They were always very active and shy. At first they resembled adult Spring Peepers. A few days later

not a specimen was visible.

John Norman has taken transformed young in Western Run Parkway on July 8, 1939. Louis Putens has collected young frogs on June 17, 1934 in Glenartney.

All amphibians have numerous enemies, no matter how innocuous they are, and the Wood Frog is no exception. Turtles, leeches, blackbirds and ducks feed on the eggs. Water and Garter Snakes, all aquatic turtles, Green Frogs, Newts, water-beetles, water-bugs, leeches, diving spiders, larvae of dragon-flies, crows, herons, and various fish feed on tadpoles. Among the enemies of the young and the adult frog are the Water Snake, Ribbon Snake, Garter Snake, Black Racer, Copperhead, Painted, Mud, Musk, Snapping and Spotted Turtles, crows, hawks, owls, herons, Opossum, Raccoon, Fox, Skunk, Pickerel, Bass, Bull Frog, and man.

Perhaps one of the most useful gifts of this animal, is its ability to leap beyond the reach of any pursuer. Other than its protective coloration the Wood Frog has no other safeguard to rely on. Usually when lying camouflaged on a woodland floor of dead leaves, it is very hard to discern, but it invariably gives itself away, by making off in leaps and bounds. Of three Wood Frogs surprised in the woods above the B. & O. Railroad at Glenartney only one was captured and that with some difficulty. In collecting them, the hands are mostly used, but other methods may be employed. One can catch these frogs by noosing them, and also by shooting them with dust shot. They are powerful swimmers, even though they spend only a short part of their lives in the water. They are common after a shower or storm. Usually any frog seen in the Maryland wilds making off with extremely long leaps will be found to be a Wood Frog.

During the egg stage the feeding is entirely from the yolk, but as the tadpole hatches, it acts as a scavenger, feeding on dead animal and plant matter. When the tiny frogs emerge from the tadpole state, they feed on small flies, ants, spiders, and other small insects found in the fields and woods in which they have scattered. The mature Wood Frog feeds on earthworms, wood-roaches, ants, spiders, and all kinds of small soft-bodied insects. The writer has never seen the Wood Frog eat during the breeding period. In captivity, these frogs are very hardy and will eat house and bot flies, mealworms, fruit-flies, earthworms, roaches, etc.

In catching its prey the Wood Frog must view the food in movement, otherwise it will disregard it. Catching its food is merely a matter of instinct. When the food does move, the frog receives a psychological impression that the object before it is food. The author found that specimens in captivity would try to swallow a piece of string dangled before them. Specimens would eat bits of small beef, if the beef was rolled or dropped in front of them. If the specimen did not snap the beef up immediately, it would not pay any attention to it thereafter, apparently not recognizing it as food. The frog usually seizes the food with a lightning-like thrust of its tongue, which is held in front of its mouth. Insects and small bits of food are swallowed entire, but on large food such as earthworms the forelimbs are employed. The sight of the Wood Frog is amazingly developed, but it is rather near-sighted.

Since this frog is of distinct value to man economically, in that it helps maintain the balance of nature by eradicating a large percentage of destructive insects, it should be protected by law. Although it is steadfastly holding its own, civilization has decreased its numbers considerably, but for many years to come, the Wood Frog - Nature's official announcer of spring - will be thought of as a real native denizen of Maryland.

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Field and Laboratory Notes

THE COMPOSITION OF THE NEST OF A PAIR OF CATBIRDS

On Friday, May 31st, an attendant at a gasoline station on Gwynns Falls Parkway at the Western Maryland Railroad Bridge, trimmed an overgrown hedge and unknowingly exposed to the public eye the secreted nest of a pair of Catbirds, situated in a low fork of a small mulberry tree. It had previously been well hidden by the high hedge, but now was visible even from the street. This nest contained four blue eggs.

The rather sudden exposure evidently startled the female considerably, as on Saturday, June 1st, she was very nervous and watched intently the turmoil of traffic and the work in the station. When the nest was approached she would scold incessantly and flutter about in nearby trees, much to the distress of a worried and bewildered male.

The home-loving pair must have decided that their privacy was completely destroyed, for they deserted their nest and prospective family, the female being last seen on the nest on June 2nd. Since both birds were observed on Wednesday, June 5th, one carrying a twig they perhaps reestablished themselves elsewhere.

The old nest was taken and carefully dismantled. Roughly it measured seven inches in outside diameter and two and seven-eights inches in inside diameter. The materials making up the nest are listed below.

54 twigs - mostly forked and branched, forming the foundation and outer structure. The longest of these measured $18\frac{1}{2}$ inches and the smallest $2\frac{1}{4}$ inches.
16 twigs with tendrils from vines.
1 strip of white crepe paper $3\frac{1}{2}$ inches wide and 22 inches long.
4 small root structures of weeds.
2 soda straws, neatly interwoven.
2 Cockle-burs (Burdock)
1 candy wrapper - Martha Washington chocolates.
4 pithy stems.
1 piece of parchment paper - $1\frac{1}{2}$ x $4\frac{1}{2}$ inches.
7 paper fragments - gasoline charge tickets.
$8\frac{1}{2}$ x 9 inch pile, 4 inches high, of dried grasses and strippings.
25 cellophane pieces - carefully interwoven with the grass.

Really "wrapped in cellophane". (cigarette and cigar wrappers).
3 pieces of red cellophane tape.
5 pupae of some undetermined species of Diptera, - found among the grass and strippings.
Inner nest made up of finer twigs and rootlets tightly interwoven and laced.

If some adventuresome individual would like to take this mass of material and reconstruct the nest the job is all theirs.

Elra M. Palmer

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IN MEMORIUM

On May 25th the Society lost by death a most valuable member, Mr. John B. Egerton, one of the foremost botanists in Maryland. Besides being Curator of Botany in this Society for many years, Mr. Egerton was Professor of Biology at Loyola College. Earlier in his career he taught at Rock Hill College and Calvert Hall.

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Notes for Month of May

Lectures, Talks and Meetings at the Society

May 3 - Bird Course. Lecture by Mr. Henri Seibert, "Birds in Nature."
5 - Bird Walk.
7 - General Assembly. Talk by Mr. Charles Ostrander, "Some Interesting Mineral Localities in Maryland."
10 - Bird Course. Lecture by Mr. Irving E. Hampe, "The Identification of Birds", and Mr. C. Haven Kolb, "Birds' Songs."
12 - Bird Walk.
14 - General Assembly. Talk by Mr. James Leake, "Reproduction in Salamanders."
21 - General Assembly.
28 - General Assembly. Talk by Mr. Harry Robertson, "Where to Find the Snakes."
4 - Annual Meeting of Board of Trustees. At this meeting the following re-elected Trustees were installed: Dr. J. Carey Taylor, Mr. Gilbert C. Klingel and Mr. Herbert C. Moore. The following officers were elected for the year: President - Mr. Edmund B. Fladung, Vice President - Mr. Herbert C. Moore, Secretary - Mr. John B. Calder, and Treasurer - Mr. A. Llewellyn Jones.

Meetings of Junior Division

May 4 - Meeting. Lecture by Mr. Edward McColgan, "Bird Banding."
11 - Meeting. Talk by Joseph Bures, "Hawks Found in and around Baltimore."
18 - Meeting. Talk by Mr. Louis Hughes, "Catching Locusts"; talk by Mr. William Moorefield, "Notes on Collecting Insects."

May 25 - Meeting. Talk by Mr. William Miller, "Snake Reproduction."
12 - Junior Division Trip to Washington. Thirty Junior members, accompanied by the President, Mr. Edmund B. Fladung and the Vice President, Mr. Herbert C. Moore. Mr. August Selckman was also with the group. A bus was chartered for the occasion. Much of the day was spent at the Zoological Park and the National Museum. Other places were visited including the Library of Congress and the Airport.

Boy Scouts of America - Troop No. 126

Meetings were held on May 6, 13, 20 and 27.

Lectures, Talks and Loans to Outside Organizations

May 2 - Baltimore City College H. R. Classes. Lecture by Romeo Mansueti, "Snakes of Maryland."
7 - Southern District B.S.A. Round Table Conference. Lecture by Mr. Francis Groves, "Snakes of Maryland."
11 - Society for Pennsylvania Archaeologists, York, Pennsylvania. Lecture by Mr. Richard E. Stearns, "Maryland Archaeology."
11 - School No. 223. Loan of Birds.
13 - Troop No. 188 B. S. of A. Lecture by Mr. Francis Groves, "Reptile Study."
16 - Troop No. 70 B. S. of A. Lecture by Mr. Romeo Mansueti, "Snakes of Maryland and the Identification of Reptiles and Amphibians."
18 - Enoch Pratt Library Branch No. 1 - Loan of Birds.
18 - Sparrows Point High School - Loan of Insect Group.
21 - Enoch Pratt Library - Walbrook Branch - Loan of Birds.
27 - Baltimore City College H. R. Classes - Lecture by Mr. Romeo Mansueti, "Snakes of Maryland."

Bird Contest at Museum

Commencing May 18th and ending August 15th a bird contest for the general public is being conducted at the Society's Museum, the Maryland House, in Druid Hill Park. Thirty-six of our common Maryland Birds are displayed. Any person identifying 26 of the 36 birds on display and filling out a form provided for the purpose will receive free of charge a copy of our leaflet entitled, "Birds of Baltimore and Vicinity." After August 15th, the list of birds will be placed in the Museum to be checked by those who are interested.

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May 16 - Monthly, Club 1; Mr. Philip Hanley, Public Opinion and the
16 - Marine Division and Its Problems, Public Affairs Monthly
Committee; Mr. Hanley, Mr. Thomas H. Eliot, Mr. Philip
Wise Kendall, and Herbert M. Morris. Mr. Eliot's address
was taken from the Report of the Committee for Constitutional
Government, "Our Heritage of Liberty." It was an elaborate
and illuminating address. Among other things he said
Mr. Hanley of Congress and the Algerians.

The Meeting of January - Issue No. 153

Meetings were held on Jan. 6, 20, 27 and 27.

Lectures, Talks and Items of Interest to Members of Institute

Feb 2 - Baltimore City Colleges - Mr. Hanley. Author of Thomas
Hornsby, "Master of Mystery."
2 - Stephen Duncan Pierce Jones Jewish Conversation. Author of
Mr. Phoebe Brown, "Masters of Mystery."
13 - Society for Experimental Biologists and Medicine, Jewish Hospital
Lecture by Mr. Robert M. Morris, Director Institute Research.
13 - Board Mr. Geo. Tree of Bridge.
20 - Tuesday No. 1st E. S. of A. Lecture by Mr. Phoebe Brown,
"Rapid Study."
16 - Tuesday No. 20 E. S. of A. Lecture by Mr. Robert Morris,
"Problems of Marriage and the Rehabilitation of Mentally Ill
Convicts."
20 - Second Floor Library Branch Mrs. J. - Lecture of Mrs.
16 - Southwest Junior High School - Lecture of Jesse Crane.
21 - Edison Park Library - Holbrook Branch - Lecture of Mrs.
27 - Baltimore City Colleges M. R. Clinton - Lecture by Mr. Robert
Morris, "Marriage of Marriage."

Trial Contest or Lecture

Commencing on Jan. 20th and ending August 15th a new contest for the general public is being conducted at the Institute Museum, the Maryland House, in Druid Hill Park. Entry is by a questionnaire which are at Library. Any person completing 20 of the 25 items on Liberty and filling out a form receives the opportunity to receive two of copies of our Institute publication, "Rights of Citizens, the Bill of Rights." Other Library Items, the list of which will be placed in the museum is to be prepared by those who are interested.

The Natural History Society of Maryland

BULLETIN

Volume X JULY , 1940 Number 11

DEVONIAN CORAL

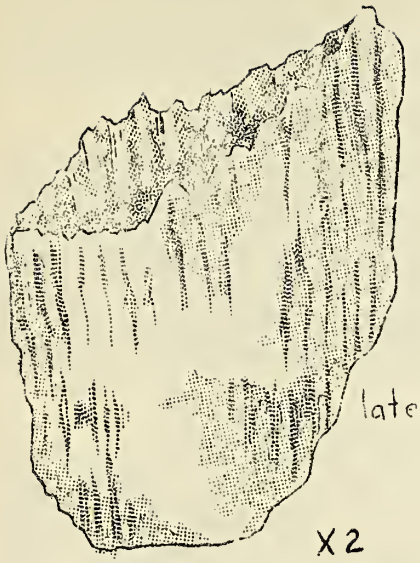
By Oscar L. Helm

Most everyone at sometime in his life has spent a while at the seashore picking up from the beach the shells or hard remains of animals that had washed ashore and died. All that is left of a once very much alive animal is his limy, calcareous, or calcium carbonate skeleton. Some of these objects are beautifully colored and some are of fantastic and bizarre shapes, sufficiently arresting to be noticed even by people who are not scientifically inclined.

There are in Maryland many seashores, but there are also other seashores and ocean bottoms where water no longer tediously erodes the banks and shorelines. These areas are now hills and mountains, farmlands, plains, and backyards, and one may walk along that which, millions of years ago, was the same as our beaches today, picking up objects from the ancient seashore that represent the skeleton impression, or even a cast of a once living animal. The animal having died, and its skeleton fossilized, it becomes harder than its surrounding matrix. As it weathers, the matrix is lost and the animal is revealed to those who care to stoop and gather up these proofs of the animals that existed many years ago.

Hancock, Maryland and its environs represents such an ancient sea bottom, one that existed some millions of years ago. There, in rock called shale, formed by the consolidation of clay, mud or silt and finely stratified so that it may be easily broken apart, one finds much evidence of the fact that this mountainous area was once a part of a vast ocean floor or shore. Here we stop and pick up our oddly shaped relics of long ago just as we may gather shells on our present shore line.

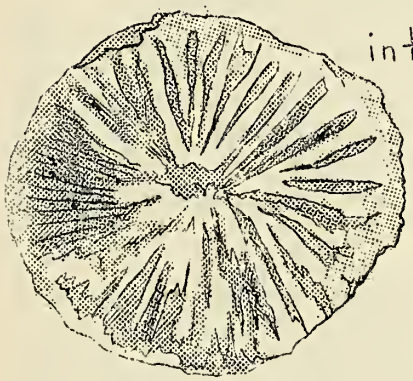
It would be impossible to describe in this article all the animal evidence found so I confine myself to one small group of the phylum Coelenterata, that group of animals which is represented today by our sea nettles, sea anemones, corals, etc. Throughout their



lateral view

X2

Zaphrentis marylandicus



interior view showing septa in calyx

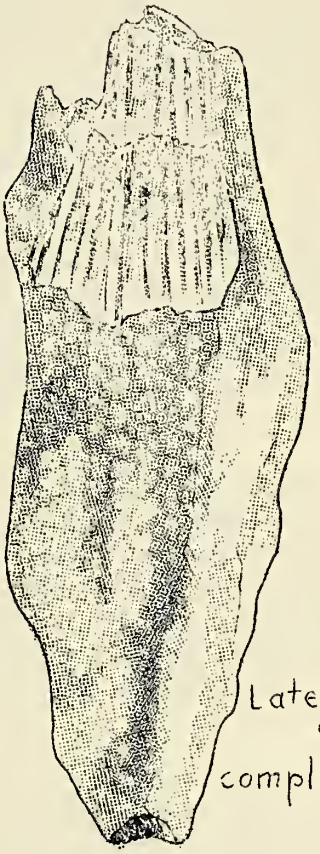
ventral view

X2

lateral view

Zaphrentis chemingensis

calyx view of lower half



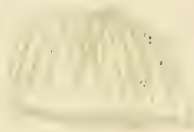
X2

Lateral view of complete specimen

X2

lower half, ventral view

Zaphrentis chemingensis



history the members of the phylum Coelenterata have been aquatic in habit. To-day most of them are marine, but a few still live in fresh or brackish water. The same condition, in all probability, existed millions of years ago and the fossil records offer interesting study to those who care to gather up these stone records.

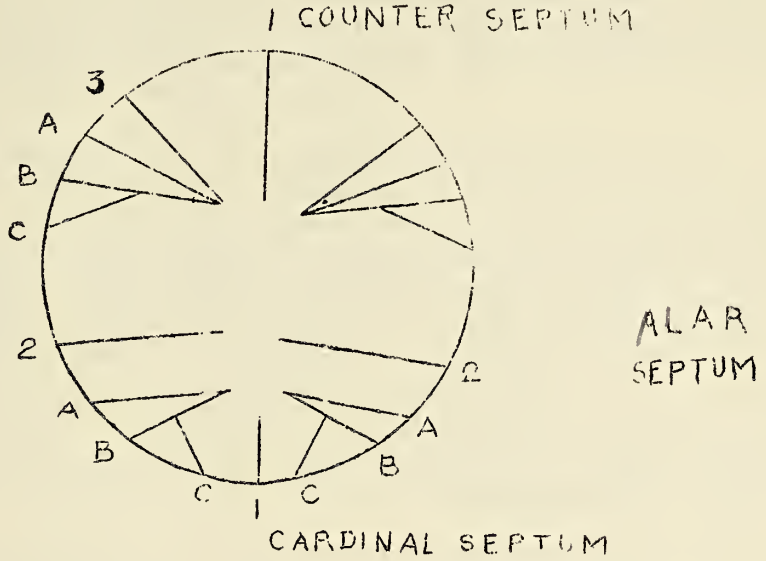
The coelenterates are arranged into several groups but it is the group made up of the cup coral of which I write. This group is known as the Anthozoa and they are both solitary and colonial in habit with complicated structures and variable architecture. This group appears to begin the early Ordovician and extends throughout geologic time to the present. Several noted authorities have traced it to the Middle Cambrian which would make it date back to about 500,000,000 years ago.

The animal or polyp that secretes the skeletal remains that we call coral has two layers of tissue known as ectoderm and endoderm. These are separated by a mass of unorganized protoplasm known as mesoglea. It is the outer layer or ectoderm that forms the calcareous "exoskeleton" known as coral. This type of skeleton is comparable to those of the shelled animals rather than those of the sponges or vertebrates.

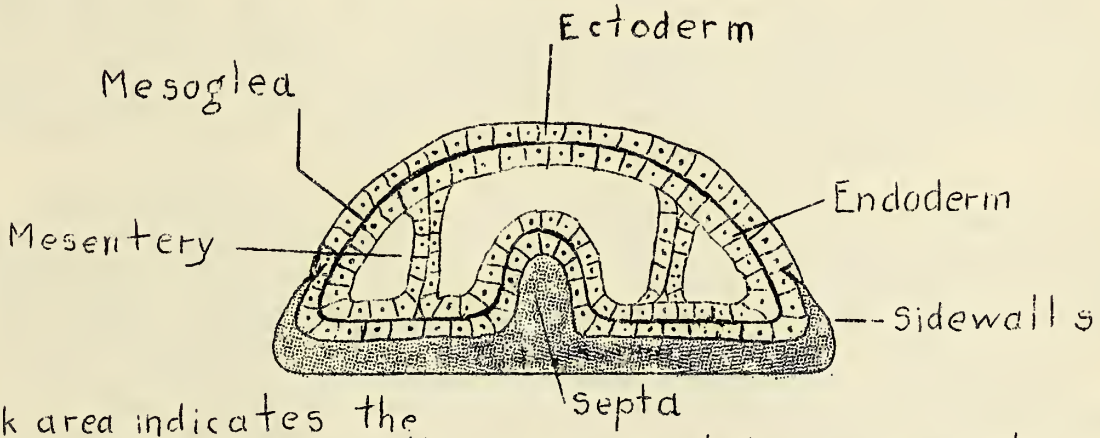
Its skeleton at no time offers a "hideout" for the animal, for it secretes and builds mostly from the bottom. Thus as it grows and reproduces, it forms a pedestal on which it rises rather than a house into which it may retract its body when in danger. The earliest skeleton has the shape and appearance of a small, hollow, conical cup. The skeleton enlarges by adding separate structures to its upper end and the various shapes that are found depend on the way the animal grows and reproduces.

The young animal is similar to a tube with a mass of tentacles around its one opening, the mouth. A short oesophagus connects the mouth and the body cavity. This body cavity is divided into compartments by radial partitions called mesenteries. When this animal settles down on some hard object its ectoderm takes the calcium bicarbonate from the water in which it lives and begins building its foundation, or early skeleton. The lower surface turns inward into a series of radial folds which are alternate with position of the mesenteries. In the grooves thus formed the animal secretes the crystals of calcium carbonate that are to become a group of plates, radially arranged called septa. As the animal grows older new folds appear and new septa form between the first ones. These first septa are called primary septa. The outer surface of the animal continues to secrete with the rest of the ectoderm and this secretion connects the radial partitions and forms a circular outer wall called the theca. The growth continues in this manner and a conical skeleton results. However, as the animal grows upward he seals his former home by plates that extend from wall to wall called tabulae or by plates that go from septum to septum called dissepiments. Often projecting up from the base at the center of the coral is a little column called the columella. This is secreted by the ectoderm in the center of the coral and is domed up instead of being ridged. When the septa join in the center to form a spongy, central mass it is called the pseudo-columella. The depression at the broad end of the coral occupied by the base of the polyp is called the calyx.

The following diagram from Twenhoefel and Shrock* illustrates the four primary septa of the Tetracoralla and the subsequent growth of other septa which are given off on either side of the cardinal septum and take up a position parallel with the alar septum. The numbers indicate the order in which the septa are given off.



From this diagram we can see how the animal increases the number of septa. As it grows upwards we can see how the animal gradually builds the fossil we find.



Dark area indicates the formation of the sidewalls and septa between mesenteries in a young polyp.

The specimens found near Hancock are of the Tetracoralla (Rugosa), so named because of the roughly annulated exterior of the corallites. They belong to the family Zaphrentidae which have simple horn-shaped, or cylindrical coralla. Though our specimens are small, some have been found in the Devonian of Kentucky that are two feet in length. The exterior of the corallites bear shallow annular constrictions placed at irregular distances, striated longitudinally by septal furrows. The calyx is very deep in proportion to the length of the corallite, its bottom concave, with sides spreading and edges thin.

* W.H. Twenhoefel & R.S. Shrock - "Invertebrate Paleontology".

Two of the specimens found are but casts of the calyx, one measuring 8 mm. in length and 13 mm. in diameter, and the other measuring 9 mm. in length and 15 mm. in diameter. They have 20 septa which fuse at the ends to form pseudo-columella. These casts do not lend themselves readily to positive identification since only the casts of their exterior and calyx have been found, but compare most closely to Zaphrentis chemungensis.

Five other specimens of Anthozoa (Rugosa) vary in size from 4 mm. in length and 9 mm. in diameter to 33 mm. in length and 23 mm. in diameter. One specimen has most of its epitheca destroyed but the inner portion of its calyx reveals several septa fairly well preserved. These septa, however, are larger and spaced further apart than those of the casts described above. Because of the poor preservation of this specimen and the filled in portion of the other specimens it is impossible to determine positively the depth of the calyx, but it appears to be shallower in proportion to the depth of the casts of the previously described specimens. Their larger size, and more distant septa places them with the Zaphrentis marylandicus.

One other specimen was found and its size and distance between septa would indicate it to be of the Zaphrentis chemungensis, length 20 mm., diameter 13 mm. This specimen is interesting, however, because of the portion of the fossil that is exposed, namely only its side, showing the growth of the septa upward. In the cleaning of the specimen it was broken, fortunately at one of its growth regions, exposing an early calyx and the lower portion of the later growth as it grew upward. The upward portion contains twice the number of septa as that of the lower portion. At the point of the break, the septa of the upper portion seem to split into two parts and continue in their growth but are doubled in number.

The Anthozoa group of the coelenterates is probably the most important since its origin was so far in the past, but it has left complete fossil records up to the present. To-day the Anthozoa still continuing their unbroken line are exclusively marine, living mostly in shallow water. These modern coral still continue to form reefs or live alone as did their ancient relatives. They grow attached to the pedestals they have formed waiting for some naturalist to collect them from to-day's ocean floor. Their hoary forebears having completed their growth are now weathering and only slowly revealing themselves to those who care to stoop and gather these ancient records of past ages.

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THE EAGLE MURAL

The Eagle Mural, painted for the Society by Frederick H. Farley through the Works Project Administration Art Project, is now on exhibit at the Society's museum, the Maryland House, in Druid Hill Park. The picture portrays two eagles and a nest of young in a typical Maryland background.

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THE REPRODUCTION OF FERNS
By Earl H. Palmer

Before the first breath of spring has melted all the snow banks away, and while the woods and fields are still bare, the ferns are astir. By the end of March the young crosiers are pushing aside the brown leaves and raising their heads. In the deserted woods, barren meadows and fields, in sheltered nooks, and crevices or rocks you will find these beautiful waving green crosiers. The April showers not only bring May flowers, but also the ferns.

Thoreau once wrote, "Nature made ferns for pure leaves, to show what she could do in that line." However, all our ferns do not have the dainty, graceful lace-work that Thoreau tells us of. Some few of our species have large coarse fronds; these, however, only intensify the beauty of the others.

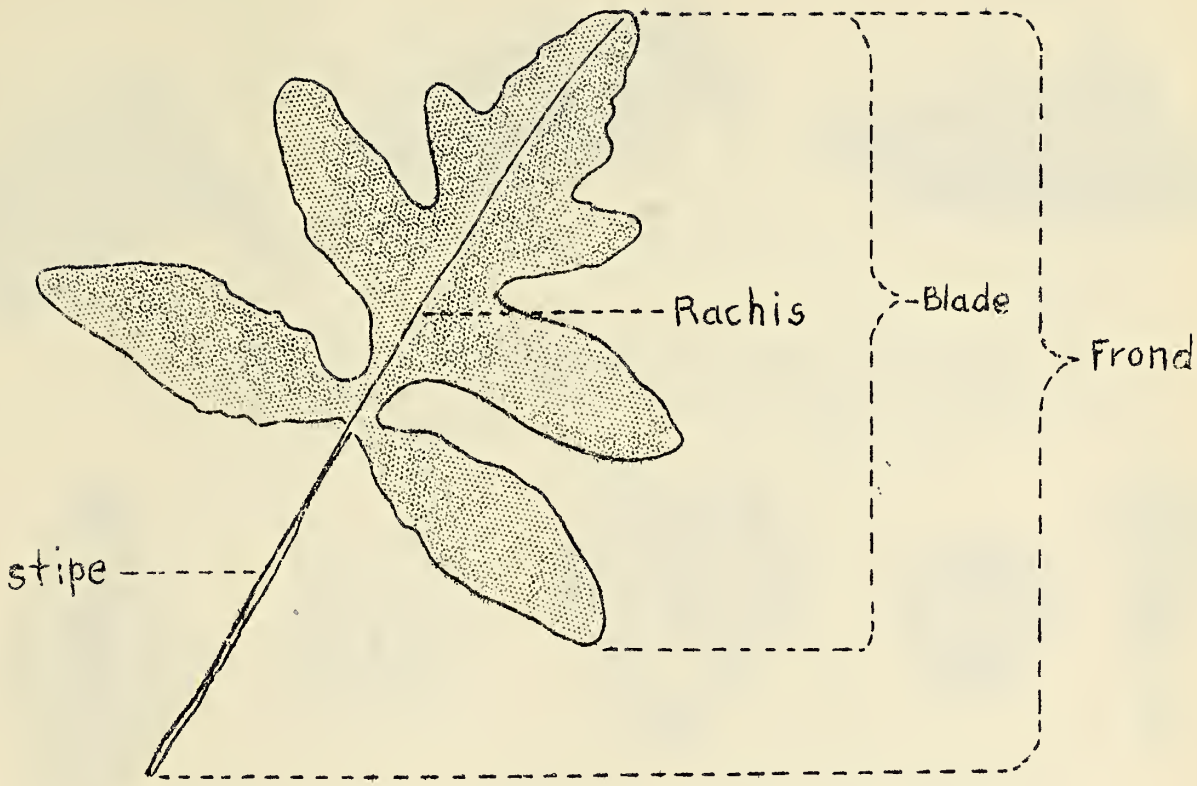
The fronds are complete in the bud of the fern plant, and their development is but the unrolling and expanding of the crosier. The crosiers of all the fern plants are essentially the same, and regardless of the variety of shapes and outlines the various mature fronds may take, the crosiers of all true ferns are coiled like watch springs. Each of the smallest divisions is rolled toward the division next larger than itself, these in turn are rolled toward the rachis; then, beginning at the apex, the rachis and stipe are rolled downward to the crown.

During the winter months, the buds are protected from the inclement weather by many hair-like, dirty-brown scales. In many species, when the fronds develop , these scales remain attached to the stipe, adding to their picturesque and rustic appearance.

The leafy portions of the fern plant are called fronds. The leafy portion of the frond is called the blade. The stalk or stem that supports the blade is known as the stipe. The part of the stipe that continues through the blade is known as the rachis. (See drawing). The word 'frond' embraces the stipe, rachis, and blade.

Contrary to the belief of the ancients, ferns have no flowers, even though one of our native ferns is known as the Flowering Fern. Ferns have two methods of reproduction -- one by vegetative propagation and the other by means of spores.

Vegetative propagation may be accomplished in several ways: (1) simple branching of the roots as in the Bracken Fern (Pteris aquilina), (2) buds forming at the base of the fronds in old plants as in the Male Fern (Dryopteris Filix-mas), (3) bulbs forming on the fronds and since they are loosely attached falling to the ground as in the Bladder Fern (Cystopteris bulbifera), and (4) the apex of the frond arching over and taking root as in the Walking Fern (Camptosorus rhizophyllus).

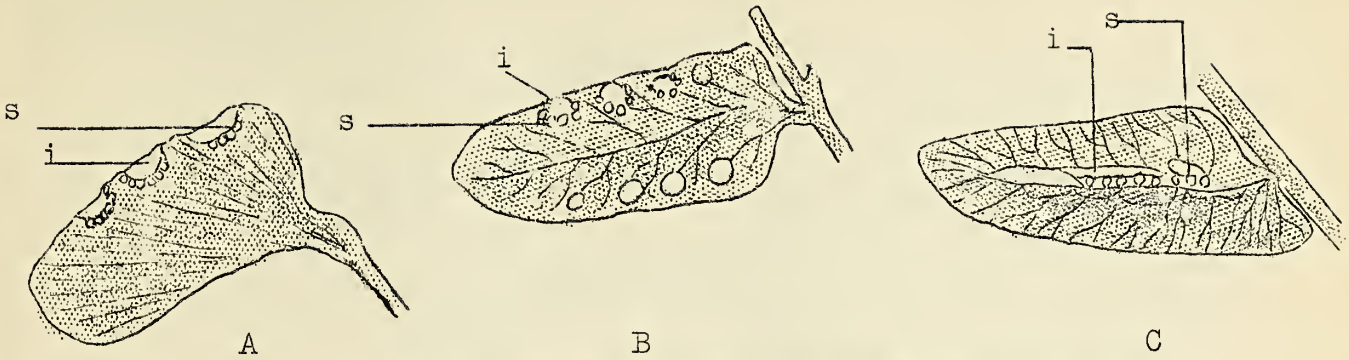


A frond of the Sensitive Fern
(Onoclea sensibilis L.)

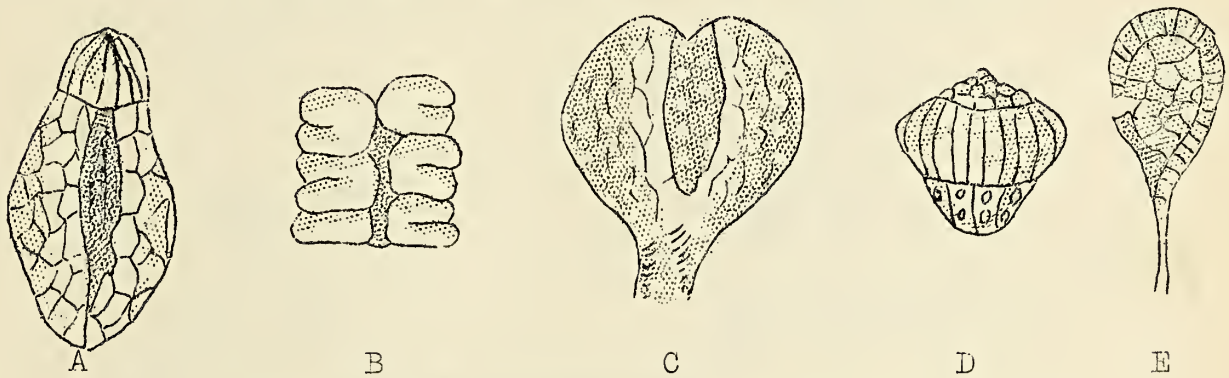
Regardless of the vegetative methods of propagation, all ferns (except the highly cultivated types) produce spores. These are usually produced on certain fronds of the matured plant which are called sporophylls. On the underside of the sporophyll and near the apex, we find numerous organs called sori. These sori consist of sporangia and a protective covering called indusia (indusium, sing.). The sori vary in color from green to brown according to their age. They also vary in shape, size, and position on the blade and pinnae. It is by the characteristics of the sori that the ferns (Filicales) are classified. (See drawing).

In the Male Fern (Dryopteris Filix-mas) the head of each sporangium is shaped like a biconvex lens. The margin is almost completely surrounded by a series of indurated cells, which form the mechanical annulus. The annulus stops short on one side where there are several thin walled cells forming the stomium or point of dehiscence. (See drawing p. 105).

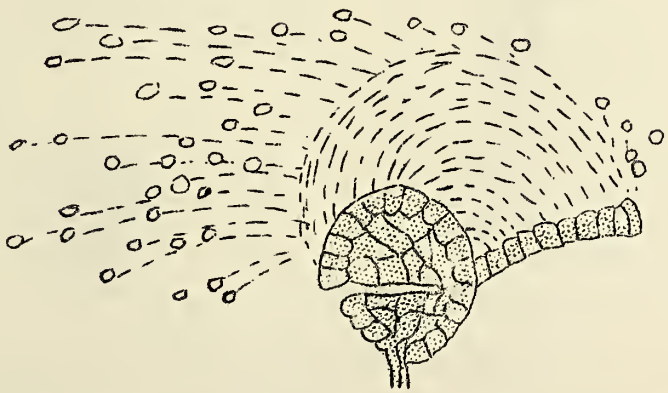
The dry condition so necessary for spore dispersal spells doom for its further development. Under suitable conditions the spores soon germinate, giving rise to the prothallium or gametophyte. (See drawing). The prothallium bears the sex organs antherida (male) and archegonia (female). After fertilization has taken place, the embryo develops into the young fern plant.



Showing the arrangement of the sporangia in
A- Maidenhair Fern B- Shield Fern C- Spleenwort
i - indusium s - sporangia

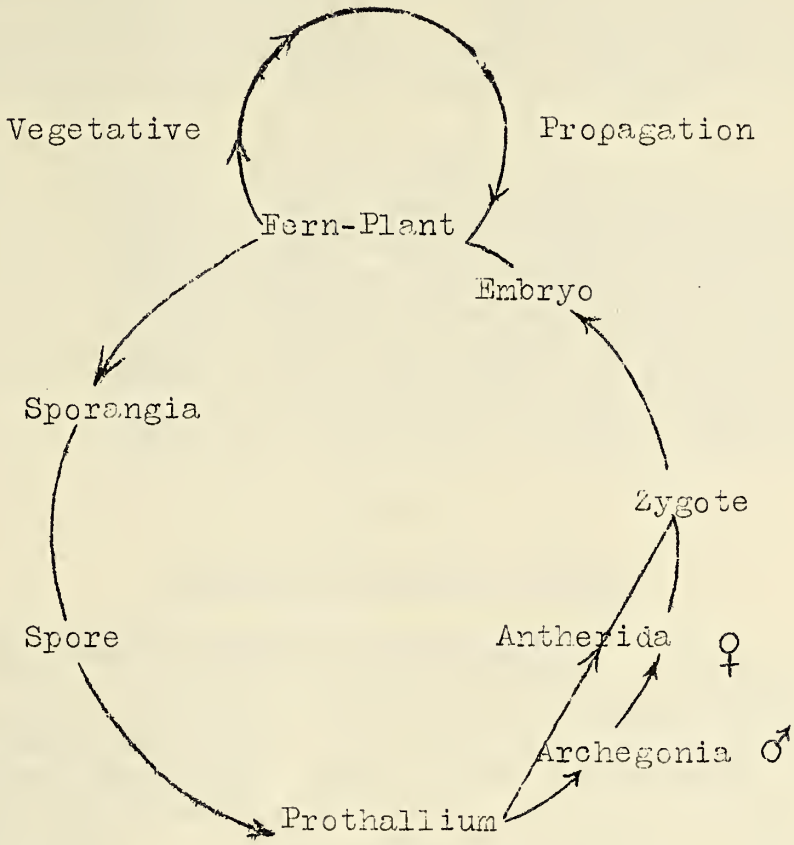


Showing the shape of the sporangia of the
different Fern Families (greatly enlarged)
A- Schizaeaceae B- Ophioglossaceae C- Osmundaceae
D- Hymenophyllaceae E- Polypodiaceae

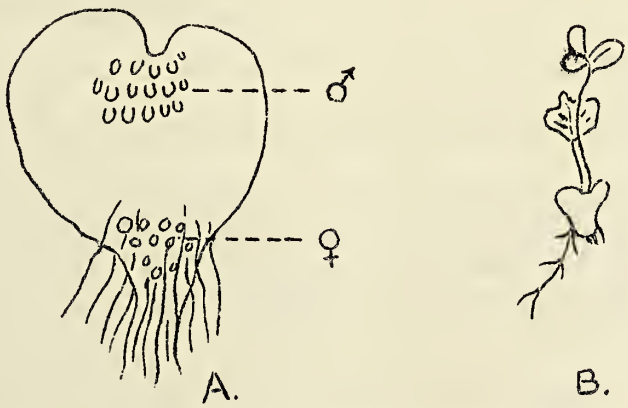


A fern sporangium showing spore dispersal
(after Atkinson) (enlarged)

Graphically the whole story of fern reproduction may be summarized thus:-



There are nearly 8,000 species of ferns in the world - the majority of which are in the tropical and semi-tropical climates. Of this number, about 45 are indigenous to the State of Maryland. If we were to triple the number of ferns now growing on our Earth, we would have approximately the number of fern plants that flourished in the past.



A - Prothallium or gametophyte (enlarged)
B - Young fern-plant (sporophyte) growing from a gametophyte (enlarged--after Bergen & Caldwell)

The first trace of a fern comes to us from the Upper Devonian Period. It was, however, during the Carboniferous Period that the ferns flourished in great abundance. Representatives of several of our present genera can be traced through geological times, the most plentiful being Osmunda, Onoclea, Lygodium, and Pteris. True indeed, is the poem by M. B. Branch, of which I quote one verse:-

"In a valley centuries ago,
Grew a little fern-leaf, green and slender,
Veining delicate and fibers tender,
Waving when the wind crept down so low;
Rushes tall and moss and grass grew round it,
Playful sunbeams darted in and found it,
Drops of dew stole down by night and crowned it.
But no foot of man e'er came that way --
Earth was young and keeping holiday."

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Notes for Month of June

Lectures, Talks and Meetings at the Society

June 4 - General Assembly. Talk by Mr. John B. Calder, "Geology of Route No. 40."
11 - General Assembly. Talk by Mr. Frank Bentz, "Casting."
14 - Bird Club Meeting.
16 - Bird Walk.
16 - Society's Annual Field Day, held this year at Randallstown, Maryland.

* * * * *

All talks discontinued during summer months; to be resumed in the Fall. Members to continue meeting as usual.

Meetings of Junior Division

June 1 - Meeting. Lecture by Mr. Earl H. Palmer, "Ferns of Maryland."
8 - Meeting. Talk by Joseph Bures, "Birds of Mt. Vernon Place."
15 - Meeting. Seminar. Biological Aspects of a Race. Participants: Joseph Bures, Henry Eichhorn and Elias Cohen.
22 - Meeting. Lecture by Mr. Frank Groves, "Field Habits of Snakes." Appointment of Joseph Bures as Chairman of Junior Division. Retirement of William Moorefield to Senior Divis. activities.
29 - Meeting. Talk by Miss Janet Byrns, "Care and Feeding of White Rats." Talk by Miss Mildred Bures, "Mountain Black Snakes."

Boy Scouts of America Troop No. 126

June 3 - Last meeting of Scouts until Fall. Scouts will meet at camp during Summer months.

Lectures, Talks and Loans to Outside Organizations

June 3 - Baltimore City College Home Room Classes - Lecture by Romeo Mansueti, "Snakes of Maryland."
7 - School No. 83. Loan of Birds.
7 - Baltimore City College Biological Club - Talk by Romeo Mansueti, "Snakes of Maryland."
11 - Baltimore City College - Loan of Birds.
24 - Opening of Summer Nature School at Society's Museum, the Maryland House in Druid Hill Park. Courses in Nature Art, Birds, Insects, Plants and Reptiles. School under direction of Mr. Elra M. Palmer, assisted by Messrs. C. Haven Kolb, Jr., Earl Palmer, and Romeo Mansueti. Art Director - Mr. Wesley Moore.
29 - Crestmont Camp - Loan of Birds.

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Photographic Contest

For Members of the Society

A reminder to our members that the time is fast approaching for our photographic contest. By October 15th the photographs should be in the hands of the Society. Rules of the contest have been sent to all our members but are here reprinted. Winning prints will be reproduced in the Bulletin.

Rules

1. Any person can enter one or more photographs in any of the first four classes.
2. All photographs must be taken by the member entering contest. (Not necessarily developed and printed).
3. Photographs must be enlarged - 6 x 8 minimum size and 11 x 14 maximum size.
4. Enlargements need not necessarily be made by person entering contest. A contestant can have them made by anyone.
5. Photographs will be judged on points.
6. Any person entering one or more photographs is automatically entered in the Open Class Contest.
7. All persons (including Junior Members) who are beginners and who are not excluded by committee as special photographers, are automatically included in the Limited Class Contest.
8. All photographs must have the title, locality, name and address on the back of photograph.
9. Photographs are not to be mounted.
10. All photographs must be received by committee by October 15,1940.
11. Any photographs already exhibited or presented to the Society cannot be entered.

Classes

1. Wild Life
   All photographs in this class must be taken in their natural environment. In case of plants no digging up and transplanting. No artificial background.

Points of Judging

Value as a Nature Photograph	3 Points
Rarity of object	2 Points
Technical excellence	2 Points

2. Domestic and Captive Classes
   These photographs can consist of animals and plants either as pets in the home or captive animals in the zoo. This admits caged and penned animals.

Points of Judging

Beauty of subject	2 Points
Rarity of object	2 Points
Scientific interest	1 Point
Technical excellence	2 Points

3. Scenic Class
   Any scene of stream, woodland, shore, mountain, waterfall or any interesting view.

Points of Judging

Beauty	3 Points
Scenic interest	2 Points
Technical excellence	2 Points

4. Specimen Class

   Only objects or specimens related to Mineralogy, Geology and Archaeology admitted.

Points of Judging

Scientific value	3 Points
Rarity	2 Points
Technical excellence	2 Points

5. Open Class
   To be judged as the best print on exhibition. Points in each of the four above classes are to be considered.

6. Limited Class
   Only such persons who are beginners and who have not so far done any work of consequence in photography.

PRIZES. The number of prizes awarded to each class will depend on the number of photographs entered in each class.

1. If fewer than 4 prints are entered , 1 Prize.
2. If fewer than 10, 2 Prizes.
3. If fewer than 18, 3 Prizes.

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The Natural History Society of Maryland

BULLETIN

Volume X AUGUST, 1940 Number 12

FISH FOUND IN GWYNNS FALLS

By Frank C. Yingling

Since 1923 I have been observing the fish life in Gwynns Falls, in the section of the Gwynns Falls Park north of Edmondson Avenue. The stream was in fair condition up to about 1928, but since that time it has become more and more polluted.

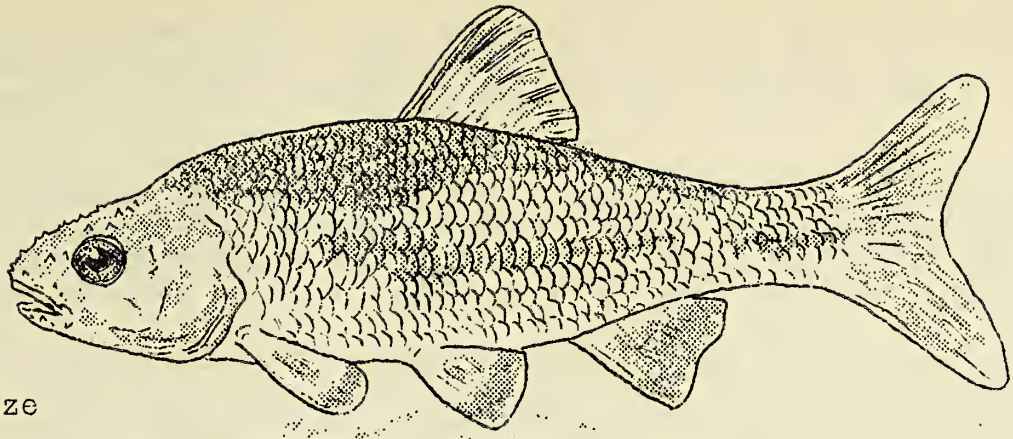
From Edmondson Avenue to the dam at Dickeyville there are few plants to be found in the stream itself. Originally, a maze of underbrush and trees marked the shore line, but to-day the shore growth is considerably thinner, and as a result there is more soil erosion.

In this region below the dam there are only a few intermittent branches to the stream. The major branch, Dead Run, is narrow, rapid and rocky, and is therefore an excellent spawning ground for the Common Sucker (Catostomus commersoni), or so it was until pollution decreased the numbers of fish.

At one time there were several dams from Liberty Road south to Edmondson Avenue. Three of these are still in use; the others have been destroyed. The dam located in Gwynn Oak Park, which is the largest one, formerly offered excellent refuge for several species of fish as well as other forms of aquatic life, but of late the constant opening of the flood gates has been very detrimental to the aquatic life. In May, 1939, the flood gates were closed so that the dam would be filled, and as a result the stream became dry. Fortunately, only a few Sunfish (Centrarchidae) had nested, for if there had been much spawning, the lack of water would have caused great destruction. Another practice which tends to decrease the numbers of fish, is the fall and winter draining of the stream; fish which are in a state of semi-hibernation for the winter are washed downstream in the sudden flow of water.

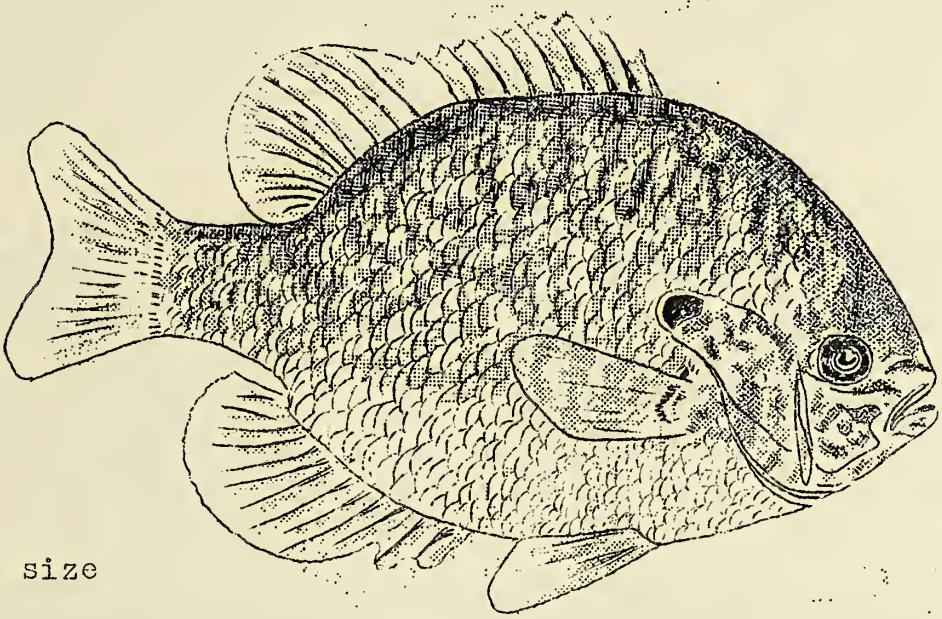
From Woodlawn to Liberty Road the stream is very swift; also its pools are larger and deeper here than they are further down, and there is a concentration of fish and aquatic flora.

Above Liberty Road where pollution is not so bad there are a



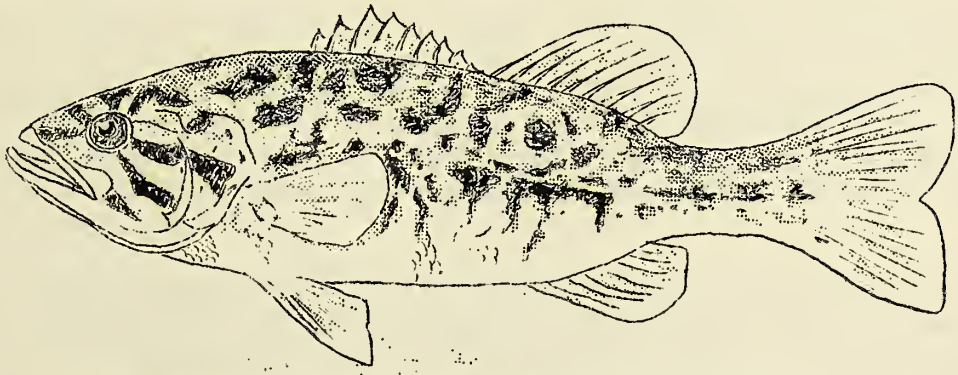
Natural size

Red-fin Minnow (Notropis cornutus)



Natural size

Common Sun-fish or Pumpkin-seed (Lepomis gibbosus)



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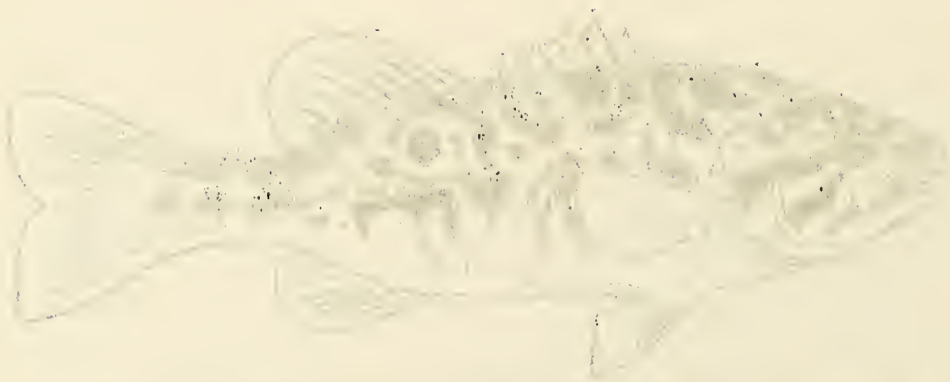
Small-mouth Bass (Micropterus dolomieu)



few sandbars covered with vegetation which serve as excellent spawning grounds for sun-fish. Alongside the bars in the swifter parts of the stream are good spawning beds for our lesser fish, the Minnows (Cyprinidae).

The piscene fauna is composed of six families, thirteen genera and eighteen species. The most common form is the Minnow (Cyprinied), which is found throughout the stream. It seems to prefer the swifter water, where it may often be seen darting against the current.

This family of lesser fish contains four genera and seven species. Those most frequently found are of the genus Notropis, which contains four species: Silver-fin Minnow (Notropis analostanees), Red-fin Minnow (N. cornutus), Swallow Minnow (N. procne), and Attractive Minnow (N. amoenus). The other three are the Horny-head Minnow (Hybopsis kentuckiensis), Silvery Minnow (Hybognathus nuchalis) and Carp (Cyprinus carpio). These fish have not been depleted to any great extent in the last few years, but they have been driven from the lower to the higher parts of the stream. Formerly the Silver-fin Minnow (N. analostanees) was very common, but it is now quite rare.

One of the most common of the Minnows is the Red-fin Minnow (N. cornutus). This fish is found in nearly all parts of the stream, but it prefers swift water. Towards the end of April I have seen these fish spawning in the upper stream where the water flows swiftly over a rocky bottom. They spawn in great numbers, so called "community spawning". The males are most brilliantly colored. When the seine is drawn through the school of fish, and lifted, the bottom of the net appears like an animated mass of red flame. The back, head, and fin tips of the males are reddish. During spawning the heads of the males are covered with many tubercles.

Silver-fins (Notropis analostanees) are common in the swift waters of the upper stream. These fish are also community spawners. The males reach a maximum size of three to four inches. As is usual, the males are the most gaudy with steel-blue colored bodies, offset by a lacy white pigmentation.

I also found in association with each other the Swallow Minnow (N. procne) and the Attractive Minnow (N. amoenus), both having their spawning period in the latter part of April. The Attractive Minnow, which is the least common of the two, has the most coloration during spawning. The lips and jaws of the male are tinged with red and the fins are a bloodish-red hue. The maximum size for these fish is approximately three inches.

In the upper recesses of the stream where the water is placid, Carp (Cyprinus carpio) are abundant, though not in such quantities as formerly. The draining of the stream has made the capturing of these fish by net quite easy. It is a very prolific fish, spawning in rather still water abundant in vegetation. Most of the Carp caught in this part of the stream are small, seldom weighing a pound, though I have observed specimens weighing five pounds or over.

The Silvery Minnow (H. nuchalis) and the River Chub (H. kentuckiensis) are quite common in the swift, rocky parts of the upper

stream. The Silvery Minnow swims near the surface of the water in small schools. The maximum size of the River Chub is 140 mm., though most of the fish range at about 75 mm.

The only fish which have been seriously depleted through fishing before the spawning period is over are the Sun-fish (Centrarchidae, which are popular game fish. The Sun-fish family is composed of three genera and five species: the Pumpkin-Seed (Lepomis gibbosus), the Yellow Belly (L. auritus), the War Mouth (Chaenobrytus gullosus), the Small-mouth Bass (Micropterus dolomieu) and the Large-mouth Bass (M. salmoides). The males of all five species carry out the parental instinct of nest building. The males are the more brilliantly colored.

The Pumpkin Seed (L. gibbosus) is the most common. It nests in June on the sandy or pebbly bottom of the shore line where the water is shallow. The males can be seen guarding the nests. In past years I have seen specimens caught which measured from five to seven inches, but lately the specimens seem smaller, seldom over three inches long.

One of the brightest hued species of this family is the Yellow Belly (L. auritus), easily recognized by the orange colored abdomen, and the flashy blue streaks on its cheeks. The maximum size attained in this locality is about seven inches, though mostly small fish have been collected. This fish is not abundant enough to be called common, but neither is it rare.

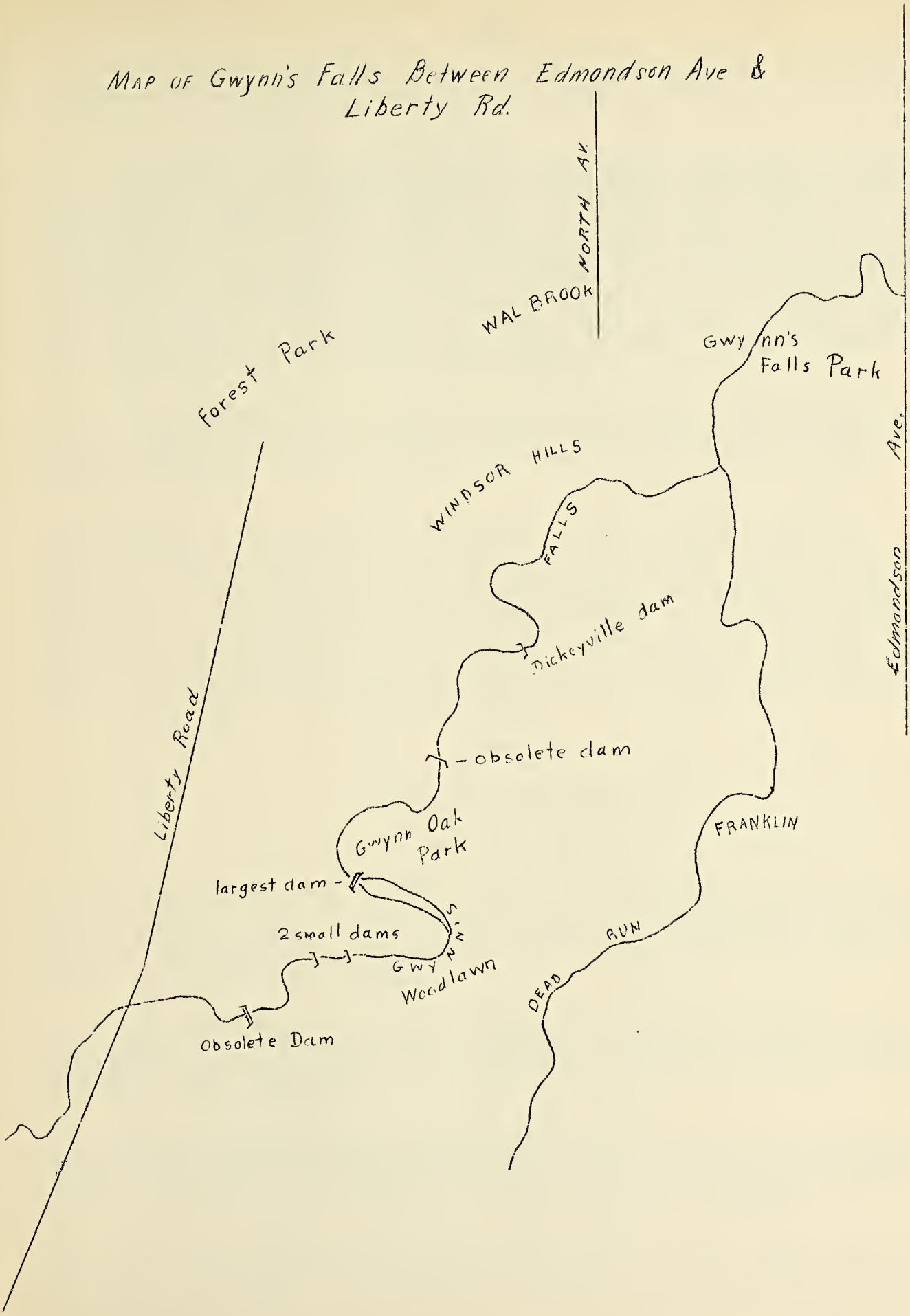
The War Mouth (Chaenobrytus gullosus) is found mostly around the old dams or where there is an abundance of aquatic vegetation. The largest specimen taken was five inches in length, a male in spawning coloration.

The two species which outrank the others for gameness are the Small-mouth Bass (Micropterus dolomieu) and the Large-mouth Bass (M. salmoides). The latter inhabited the lake in past years, while the former frequented the faster parts of the stream. Years ago this species was not found in any great abundance, but recently I have noted two specimens, both Small-mouth Bass. The spawning of these fish takes place from June to the middle of July, though I have collected specimens in the latter part of July that retained their eggs.

The family of Catfish (Ameiuridae) in this locality is composed of two genera and two species, the Horned Pout (Ameiurus nebulosus) and the Mad Tom (Rabida insignus). The former is the most abundant and attains a larger size than the latter. I find it prefers the mud bottom, or a place where there is a lot of sunken debris. The maximum size taken was about 240 mm. in length. Only a single specimen of Mad Tom has been collected from this locality; it was 75 mm. in length. I do not think it is common here.

The Eel family (Anguillidae) is represented with but a single genus and species, the Common Eel (Anauilla rostrata). In past years this fish was abundant throughout the stream and specimens of fifteen inches in length were frequently taken. I have not observed any migrating elevers on their usual migration from their places of birth. These fish can withstand fouler water than most species; but

Map of Gwynn's Falls Between Edmondson Ave & Liberty Rd.



it is most likely because of the severe contamination of the water at the mouth of the stream at Spring Gardens, that they enter other streams.

The Sucker family (Catostomidae) is represented by two genera and two species, the Common Sucker (Catostomus commersoni) and the Black Sucker (Hypentelium nigricans). The former is found in considerably greater numbers and reaches a larger size. In April I have observed numerous specimens of this species ascending the smaller branches for spawning. It seems to prefer the pebbly bottom where the water is quite rapid for its spawning grounds. The females are very prolific, and the eggs are rather large in size. I also noticed that there were no dead fish found after spawning, only a single female and this fish as yet had not spawned.

The Black Sucker is common in the very swift water above the pools. The maximum size collected was about 220 mm. in length. The Black Sucker is darker in color than the Common Sucker and seems to be more active.

Found on the bottom of the stream and in great numbers is Olmsteds Darter (Boleosoma olmstedi). Only a single genus and species of this fish has been collected from this locality. Because of a degenerate air bladder this fish gives the appearance of darting from place to place instead of swimming, and can be readily recognized by this habit. It reaches a size of 75 mm. through this section. Its spawning period is rather protracted, as I have collected specimens in the latter part of May that have still retained their eggs, while others had spawned.

*****

THE LOCUST LEAF MINER

By T. Milton Oler

Several years ago at Shore Acres in Anne Arundel County, Maryland I noticed that the locust trees in the vicinity were in bad condition as to foliage. In fact, the leaves looked as though they had been subjected to a great heat and were dry and brown, and falling in the early part of July.

This year again the same thing has happened at Shore Acres; many trees have apparently been attacked, although in some cases seemingly unaffected trees are immediately adjacent to those which have been badly damaged.

Upon investigation I found that the foliage of the damaged locust trees (Robinia pseudoacacia) had been subject to the depredations of a beetle, the Locust Leaf Miner (Chalepus dorsalis), which is well known for its attacks on these trees in midsummer.

The adult beetles, which are about 1/4 or 3/8 of an inch long, make their appearance in early spring as soon as the locust leaves are fully developed. The beetle is easily recognized by its yellow or orange wing coverts with a stripe of dark brown along the suture of the wing cases. The head is dark brown or black, and the underside of the body and also the legs are of the same color.

Although these beetles seem motionless upon the leaves, if examined closely, they will be found to be feeding, and if disturbed they will fly away for quite a distance.

Let us trace the life history. The eggs of the Locust Leaf Miner are laid on the underside of locust leaves in small masses of three to five glued together and partly covered with excrement. The first egg is laid flat on its side and the others are so placed as to partly overlap the first one, thereby standing obliquely, with one end of each egg touching the surface of the leaf. A brown spot soon appears on the upper leaf surface, marking the location of the egg mass beneath.

Upon hatching, the larvae of this beetle enter the leaf under the protection of the leaf mass covering, all entering through the one hole that is made by the larva which hatches first, and all of them occupy one common mine. In from two to four days they consume all the mesophyl in the mine; they then leave the first mine, and each larva makes a mine of its own. There are several such changes of habitation and the damage to the tree is greatly increased. In about three weeks the larval life is over, and pupation occurs within the mine. The pupal or dormant stage lasts one week to ten days.

Then when the adult beetle emerges it breaks its way out through the thin brittle epidermis of the leaf. Later the adult beetle hibernates beneath locust bark.

In this section of the country and northward there is a single brood annually, but further south several broods mature in a season.

Fortunately many millions of the larvae are killed when the leaves are blown from the trees, and many beetles are eaten by sparrows and possibly other birds. Moreover the locust trees continue to put forth new leaves until late in September, and since in the following year they appear as vigorous as ever, they are not, it would seem, vitally damaged by the activities of the Locust Leaf Miner, for the insect is more a nuisance than a danger to the tree's life.

I have noted also that this insect seems very much more prevalent in some years than in others.

*****

THE BALD EAGLE

By Frederick A. Saffran

Until recently, headed for extinction and listed as predatory, and open game for anybody with a gun, at any time, the Bald Eagle, the national bird of these United States, would have been listed with the other extinct species such as the heath hen, the passenger pigeon and the Carolina parakeet, but instead it has finally gained the recognition due it long ago, having graduated from the predatory list of Maryland into the full protection under the Federal Government by a recently enacted bill (The Weeks-McLane Act) passed by Congress and signed by the President.

Our Society's efforts throughout the years to secure this protection, accorded to migratory song and insectivorous birds has been unceasing, and at last the fight has been won. The fight has been a stubborn one, chiefly because the hunters declared the eagle was predatory and a menace to small game. The alleged depredations of the eagle were very much exaggerated - the sum total of the damage wrought by the species was negligible.

True, it is not the fierce, fight-to-the last dignified chap it was supposed to be when it was selected by our forefathers to represent the indomitable spirit of the new America, but it is far from being the arrant coward many would make it. It is quite true that it is an incurable thief, robbing the osprey of its hard-earned dinner whenever the opportunity presents itself.

However, although it may not be as noble as it looks and far from epitomizes the Spirit of America, it is our national bird and as such, should have been given, long ago, the protection it has just been accorded.

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CORRECTION

Notes on the Taxonomy of the
Genus "Chaos"
September, 1939
Volume X, Number 1
Page 9, paragraph 5

In the Synonomy "1879 - Leidy - Amoeba princeps (Invalid)" the word "princeps" should read "proteus."

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Notes for the Month of July

Meetings and Lecture at the Society

July 9 - Talk by Mr. Andrew Goss, "Recent Bird Notes of Special Interest."

19 - Awarding of certificates to pupils of Summer School.

26 - Meeting of Bird Club.

28 - Bird Walk.

General Assembly Talks discontinued for summer.

Junior Division

July 6 - Talk by Rennert Smelser, "The Swallows of Maryland."

6 - Nature Quiz. First Prize, Victor Spruill; Second Prize

Louis Hughes; and Third Prize, Carl Oertel.

July 13 - Talk by Joseph Schreiber, "The Mineral Nickel and the Nickel Industry."

20 - Talk by Thurman Sewell, "Life History of the Fence Swift."

Talk by Joseph Bures,"Experiences with Owls."

27 - Talk by Henry Eichhorn, " Mitogenetic Rays."

Exhibitions, Lectures and School Loans

July 2 - Camp Crestmont - Loan of Mammals.

19 - University of Maryland - Loan of Insects.

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SPECIAL NOTICE

THE NEW BULLETIN

Beginning with the September number, Volume XI, Number 1, the BULLETIN will be provided with a cover and will appear every two months. Each issue will contain about twice as many pages as the present BULLETIN. Drawings, planograph pictures, and occasional line cuts and half tones will be included as usual.

Special thanks are due those members and friends of the Society who have contributed articles as well as other work during the past years, and it is the hope of the Editorial Department that these older contributors will continue to support the Society's publication and that new contributors will rally to the call. Although articles referring to Maryland Natural History are especially desirable, it is not the policy of the BULLETIN to limit the publication to matters applicable to Maryland alone. In some cases the fauna and flora of other states or countries have been compared or contrasted with Maryland's, - articles of this type are usually interesting and possess scientific value. Travel articles with a scientific flavor are also, as a rule, interesting. Even with respect to articles relating to Maryland Natural History, efforts are made, as much as possible, to keep the subject matter diversified.

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Bibliography